GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

Mr. Thomas and the Gas Industry.

OUR readers will not perhaps be surprised to learn that the invitation extended to the National Gas Council by Mr. J. H. Thomas (Lord Privy Seal), to discuss with him what contribution the gas industry could make to the solution of the unemployment problem, has created a grievance in the breasts of some of those associated with the coke oven industry. Their view is apparently that Mr. Thomas has acted too precipitately and without due consideration, and that he has not taken into account the possibilities of gas supplies from coke ovens. We ourselves have a much higher conception of Mr. J. H. Thomas's intelligence; nor do we feel that in consulting the great Public Utility services of the country with a view to finding some solution for a very urgent national problem he has been either ill-advised or unduly precipitate. Indeed, we think his action must be applauded by all whose judgment is not warped by personal considerations.

The National Gas Council represents one of the country's greatest industries—an industry which supplies throughout the length and breadth of the land a commodity well-nigh indispensable for domestic and industrial purposes. It employs directly 113,000 men, and indirectly a very much larger number, uses annually over 18 million tons of British coal, and produces, in addition to gas, a large number of highly important and valuable residuals, many of which form the raw materials for other industries. It is an industry, moreover, whose components, in common with those of the other Public Utility services, are strictly controlled by Act of Parliament, and who may, therefore, should opportunity offer, be safely entrusted with the using of public money in the manner contemplated in the Development (Loans, Guarantees, and Grants) Bill now before Parliament. Doubtless it was considerations such as these which weighed with Mr. J. H. Thomas and his advisers when, thus early in the new Government's search for stimulants to employment, the representatives of the gas industry were called into conference. That such considerations will weigh with those whose outlook is jaundiced by a grievance is not to be expected; but for the benefit of those ignorant of the technicalities, it may be pointed out that no good ground for the existence of any grievance exists.

The coke oven industry, suffering acutely from the depression in the iron and steel industries and from lack of up-to-date plant (of this we have been assured by the report of the National Fuel and Power Committee), is seeking fresh outlets for its products, and has looked with envious eyes upon the sphere created over a hundred years ago, and ever since occupied with a high degree of efficiency, by the gas industry. It has invaded the latter's coke markets, and actually proposed to the National Fuel and Power Committee that gas undertakings should be compelled by law to take coke oven gas. This proposal, call it naive or what you will, was promptly turned-down by the Committee, who were no doubt influenced by the fact that already a large quantity of coke oven gas is being supplied under contract to many gas undertakings situated in the coke oven area, and that the number of purchasers and the quantity of gas sold is increasing rapidly year by year. Incidentally this state of affairs gives the lie to any suggestion that a prejudice against the use of coke oven gas exists. Indeed, that the present rate of development of the use of this gas by gas undertakings is not exceeded is due largely to the fact that, while gas undertakings are under statutory obligation to maintain a regular supply of gas of a declared calorific value year in year out at all times of the day and night, coke ovens are under no such statutory obligation, and, as experience has shown, may for one reason or another discontinue supply, with very serious consequences for those gas undertakings which are dependent upon it.

Again, it is plaintively asked on behalf of the coke ovens if the Government are going to subsidize gas undertakings, or assist their carbonizing activities without waiting for the report of the Area Gas Supply Committee appointed on the recommendation of the National Fuel and Power Committee to conduct an inquiry into the economic distribution of gas. Whether with Governmental assistance or not—and such assistance has not been lavish in the past—gas undertakings must continue, without waiting for any Committee's report, to extend their activities, carbonizing or otherwise, to meet the ever-growing demands of their consumers; and if in doing so they can further Mr. Thomas's schemes, we venture to think that a very admirable double purpose will immediately be effected.

In conclusion, it may be noted that the adoption of the coke oven policy would inevitably add to Mr. Thomas's problem in that it would involve the closing-down of gas-works and the consequent throwing out of employment of a large number of gas workers; nor would there be any corresponding advantage to gas consumers.

Points from the Alkali Works Report.

An extract from the 65th Annual Report on Alkali Works, presented to the Minister of Health by Dr. T. Lewis Bailey, the Chief Alkali Inspector, is published in our columns to-day. It is obvious from his report that the difficulties with which many, particularly the smaller, manufacturers of sulphate of ammonia are faced do not decrease. This is reflected in the figures for the number of works registered during 1928—470 sulphate and muriate works, compared with 501 in 1927, while the number of gas liquor plants fell from 78 to 75. Dr. Bailey emphasizes that the manufacture of sulphate from gas liquor at central establishments appears to afford at any rate a partial solution to the problem; and this, of course, entails either concentration of weak liquor or the production of stronger liquor, at the individual plants prior to transport. In some instances, final scrubbing of the gas with sulphuric acid instead of fresh water has served a useful purpose.

Then there is the effluents problem; and Dr. Bailey calls attention to the desirability of spraying devil liquor in a hot chimney, or evaporating it by direct heating if the vapour can be carried to a chimney, or eliminating some of it in producer fires. The point to be remembered in this connection is that the devil liquor must be taken off from the hot end of the condensers, to ensure absence of hydrocyanic acid and sulphuretted hydrogen. Another line of action which should be pursued is to maintain a properly regulated flow of spent liquor from the works throughout the year; and in order to minimize the size of storage tanks, it may be advisable to work the sulphate of ammonia plant so that shut-down periods are of shorter duration than formerly. A third rule is to separate the liquor from the tar immediately and as completely as possible. These points are not new, but their importance merits repetition.

Dr. Bailey's notes on the analysis and constitution of ammoniacal and spent liquors are of much interest. Ammoniacal liquor contains a good deal of sulphide, and it is desirable that this constituent be removed prior to the determination of the oxygen absorbed in the permanganate test. Lead carbonate removes the sulphides rapidly and completely, but it has been found that the values obtained for the oxygen absorbed after treatment with this compound are lower than corresponds with the removal of sulphide alone. Dr. Bailey ascribes a reason for this discrepancy, and states that the removal of sulphide by a lead salt should not be attempted. Zinc and cadmium salts may be employed instead, though experiments indicate that zinc salts are more suitable. The method suggested is set out in our extract from the report. Attention is also directed to the determination of thiosulphate and sulphide in ammoniacal and spent liquors. When certain of the polyhydric phenols are present, the customary iodine titration method for the determination of thiosulphate and sulphide may lead to results which are too high. Trustworthy values are, however, obtained when the solution to be titrated is made acid by the addition of sulphuric or hydrochloric acid.

Koppers Coke Ovens for Beckton.

The continual growth of the business of the Gas Light and Coke Company necessitates the erection every year of additional plant capable of carbonizing daily some 500 tons of coal, as well as a great deal of new subsidiary plant for purifying the gas and dealing with the residual products. A new departure is being made this summer by the erection of a battery of coke ovens which will be the only coke ovens installed at any gas-works in the British Isles. The Company's Engineers and Chemists have just visited America, Belgium, France, and Germany, as well as plants in this country, to study all present-day methods of coke oven practice, and a contract has now been placed with the Koppers Coke Oven Company, Ltd., of Sheffield. The ovens will be capable of carbonizing 1200 tons of coal a day, and are to be erected at the Beckton Works, which, as our readers are aware, are already the largest works in the world for the manufacture of town gas.

The new installation, which will increase the output of these works by over 85,000 therms of gas a day, will, with the necessary handling and subsidiary plant, cost about one million pounds and take about two years to complete. It is being laid down so as to be capable of extension, if it proves satisfactory, by three further units of similar size; and the completed plant would form one of the largest and finest carbonizing installations of its kind. On later pages of our issue to-day will be found a description of the installation which is to be erected.

Chamber Ovens at Wandsworth.

We are able to give our readers this week the working results of a 3 million c.ft. per day intermittent vertical chamber oven plant ("C.O.L." system) at the works of the Wandsworth, Wimbledon, and Epsom District Gas Company. Actually the figures relate to a guarantee test of 28 days' duration, but no special test conditions were imposed, so that the results represent typical every-day operation. The first point which will impress our readers is that the make of gas per unit area is high; and then come collateral advantages: No restriction regarding choice of coals; high efficiency of the steam-carbon reaction; low maintenance, labour, and power costs; comfortable working conditions; excellent yield of gaseous therms; and low breeze production.

Not long ago we suggested that gas engineers might regard it as fortunate that local conditions play such an important part in the choice of new plant; otherwise they would have the utmost difficulty nowadays in arriving at a clear and convincing decision. There are so many excellent forms of carbonizing and gas-making plant now available, each system with its particular merits, and all delivering gas into the holder within the smallest margin of cost variation. This, of course, is a most satisfactory state of affairs, not merely from the view of flexibility in meeting a wide and varied "residuals" market, thereby obviating over-saturation of any one field, but also because the competition engendered results in constant improvements in every system.

To return to the "C.O.L." plant at Wandsworth (erected by Chamber Ovens, Ltd.), an interesting feature is the provision of external producers of the Lymn-Rambush pattern. These are steam boiler jacketed, and are fitted with mechanical grates with automatic ash discharge. The producer gases pass through waste-heat boilers, Lymn static washer-coolers, a centrifugal cleaning fan, and finally, via a recuperator, to the combustion chambers. This method of obviating the disadvantage of clean producer gas externally generated—dissipation of the sensible heat of the producer gas—appeals to us very much indeed; and the system employed at Wandsworth will doubtless save much money by eliminating the damage to refractories caused by impingement of gases containing ferruginous dust and alkali. Study of the figures printed in later pages of this issue indicates the efficiency of the "C.O.L." plant; and that its operation is generally highly satisfactory could be demonstrated in no better manner than by the fact that the Wandsworth Company have just ordered another and larger unit.

A Policy to Avoid.

The tale unfolded by a deputation from the tenants of certain council houses to the Walton-on-Thames Urban District Council should prove a warning to others who may be about to launch some similar scheme. The deputation had been instructed to wait upon the Council with the following petition: "In the opinion of the tenants the "Council should provide a secondary means of cooking; "a gas meter and cooker to be installed in each house "free of charge to the tenants. This, in our opinion, is "essential to the health and well-being of the tenants, "as the conditions now are appalling, and a disgrace to "the present-day standard of living." The signatures of all the residents on the housing site were appended.

In the kitchens which serve them as living-rooms, the women are "cooked-up"—especially in the summer—

while, on the other hand, during last winter's frost some tenants were forbidden to light fires in their ranges, and so suffered from the intense cold. Gas, it was urged by the deputation, provided the only means of secondary cooking which the tenants could entertain, since their money would not run to electric cooking. A member of the deputation said that he had occupied one of the houses for eight years. There was an enormous range, which consumed coal at the rate of 2½ cwt. a week. Whenever the fire was made up, ashes flew all over the room. There were no alternative arrangements for cooking. He hoped that the Council would expedite the provision of secondary means of cooking. Electric cooking was right outside the working man's pocket; and he would like to see gas, with slot meters, supplied.

After the deputation had withdrawn, the Surveyor explained that he had obtained from the Gas Company certain terms, which were conditional upon 75 p.ct. of the tenants agreeing to take gas. A member recalled that originally the question had been sympathetically considered by the Council; but as the majority of the tenants would not then take gas, the Company declined to put it in. The Surveyor, in reply to this, pointed out that the Council's original scheme provided for electricity for lighting and gas for cooking; but the Ministry gave the Council the choice of one or the other, and would not sanction the expense of both services. The Council at the time thought it preferable to have electricity for lighting, and to defer the question of gas cooking.

Whatever may have been the precise circumstances in the first place, it is quite clear from this account that for cooking a coal fire only does not meet the views of the average council house tenant. The moral is obvious: gas offers the correct solution of the problem. It would be hard if the tenants were compelled to go without this solution as the price of the doubtful blessing of a supply of electricity for lighting.

Gas Poisoning Inquiry.

The first meeting of the Board of Trade Committee who are inquiring into deaths from gas poisoning was presided over by Sir Evelyn Cecil. It was agreed that the Committee should meet in public unless it be decided on any special occasion to the contrary; and the first public meeting will take place at the beginning of October.

Development Grants Committee.

A week ago we indicated in the "JOURNAL" (p. 181) the main objects of the Bill introduced by Mr. J. H. Thomas as part of the scheme of the Government for dealing with unemployment. The Treasury are to be authorized to guarantee certain loans to be raised in connection with public utility undertakings, and to permit the giving of financial assistance in respect of expenditure incurred, or loans raised, for works of development. In connection with commitments that might be made under the measure, Mr. Thomas assured the House of Commons that he was being advised by a Committee of public-spirited business men, whose names, when announced, would inspire general confidence. He has since justified his assurance by the announcement that the following are the gentlemen who have agreed to serve on the Advisory Committee under the Bill: Sir Arthur Duckham (Chairman), Mr. Gaspard Farrer, Mr. George Hicks, Sir Clement Hindley, Sir Frederick Lewis, Bt., Sir William McLintock, Sir Henry Maybury, Mr. Frederick Palmer, and Mr. Arthur Pugh.

Still Growing.

It is always with peculiar satisfaction that we record the installing of new gas-works plant which has the effect of increasing the manufacturing capacity or extending the service facilities. A new carbonizing plant or an additional storage holder is an undertaking of a substantial character, not lightly to be entered upon; and therefore, when such a scheme is brought to fruition, it is a sure sign of a growing business in the present, and a robust faith in the future. The pages of the "JOURNAL" have lately contained many of these welcome signs. In this number we chronicle the inauguration of vertical retort installations at Gorleston and at Peebles; while in the matter of holders, there are reports of similar functions at Hornsey and Milton Regis. A week ago, too—to go no farther back—we described the opening of a new holder and other extensions at Oswaldtwistle.

Electricity on Gas-Works.

During the proceedings in connection with the inauguration of the Woodall-Duckham vertical retorts at the works of the Gorleston and Southtown Gas Company, reference was made to the friendly relations which subsist between the Great Yarmouth Corporation Electricity Undertaking and the suppliers of gas in the area. This is as it should be; and it is a state of affairs which is less rare than some people would lead one to believe. Mr. Henry Woodall, M.Inst.C.E., the Chairman of the Company, in the course of his remarks, pointed out that concerns which the British Gas Light Company control like to draw their supplies of current from the local municipal electricity undertakings, though they could probably generate it somewhat more cheaply themselves. This is a sound policy, as doing something to increase that friendly feeling which is mutually advantageous.

British Gas-Light Company in the East.

Last year the British Gas Light Company acquired control of the Gorleston and Southtown Gas Company, which had been in existence for over seventy years. The reputation of the British Gas Light Company is such that great things are expected of the change-over. It was announced last week by the Chairman, Mr. Henry Woodall, that already since the take-over there have been two small reductions in the price of gas. The Directors are anxious to continue this policy of reducing the cost of gas to the consumer; and an important step to this end is the provision of a continuous vertical retort plant which affords plenty of room for expansion beyond the present maximum demand.

Bussey Coal Distillation.

There was published on pp. 188-189 of last week's issue of the "JOURNAL" an account of the official opening of the big Bussey coal distillation plant at Glenboig. The installation, which is stated to be the largest low-temperature unit in the world for the treatment of bituminous coals, consists of fourteen retorts; the coking chamber being 30 ft. high, 2 ft. square at the top, and 8 ft. by 3 ft. at the base. Control of the plant is maintained by varying the suction at the top, the pressure at the base, the amount of air, gas, and steam admitted through the grate, and the rate of operation of the discharge mechanism. The statement of the Company was that, treating between 600 and 700 tons of Scottish coal per day, it would produce 450 tons of smokeless fuel, 20,000 galls. of oil, and 20 million c.ft. of gas of medium calorific value, suitable for engines, boiler firing, furnace heating, and general work. The Company have now published a statement by Mr. R. B. Parker (Consulting Engineer and Managing Director) to the effect that he is more than satisfied, not only as to the flexibility of the operation of the plant, but as to the quantity and quality of all products. He says that, from the results obtained from the operation of the retorts now working, the yields of gas, oil, and smokeless fuel, even at the necessarily slow starting speed, are fully up to expectations and published estimates; and he is satisfied that when the plant is working to capacity—and therefore with increased efficiency—the yields will exceed his original estimates. Long-term contracts have been signed for the sale of the whole of the oil and gas output of the Glenboig plant.

The "Horrible Inferno" at Battersea.

The question of the proposed new Battersea Power Station was before the Westminster City Council at a meeting last Thursday week, when a recommendation from the Law and Parliamentary Committee was adopted favouring the promotion of a Private Bill in Parliament to revoke the consent given by the Electricity Commissioners to the erection of the station, and to prevent the Commissioners giving further consents to

the erection of super-electricity stations, or the extension on a large scale of existing generating stations, within the County of London; and it was agreed as an addendum to the proposition that the Minister of Health be asked to receive a deputation from the boroughs concerned (Kensington, Chelsea, and Westminster) and the Dean and Chapter of Westminster. Prior to the meeting the Committee had drawn up a long report reviewing the whole question. They admit that it might be said that if such a Bill were promoted the Power Company would ask at least to be indemnified against all the commitments which they have entered into in respect of the station, which already amount to £2,000,000. While they (the Committee) are not prepared to admit that such a liability would be imposed on the promoters, they are of opinion that it would be "far better for the local authorities concerned to pay such an indemnity than to be saddled with a power station that might cause continuous injury to health and damage to property." One of the speakers at the meeting said that, even if the figures which had been given as the sum required by way of compensation were complete, they were nothing compared with the great damage that was likely to be done by "this horrible inferno over at Battersea."

The "Gas Salesman."

The "Gas Salesman" Supplement to this issue of the "JOURNAL" is larger than usual, and contains much of interest to the distribution man. There is a report of the recent meeting of the Industrial Gas Salesmen, and a second article on "Gas Fittings in Period Rooms." The Circle meetings, too, embrace much useful information; and there is an instructive article on "Mechanical Repairs and Economy."

PERSONAL.

Mr. A. L. MACMILLAN, M.A., LL.B., has resigned his position on the staff of the Aldershot Gas, Water, and District Lighting Company; and Mr. RICHARD H. STUDHOLME, M.A., has been appointed.

Messrs. A. G. Sutherland, Ltd., Gas Meter Manufacturers, Warwick Road, Greet, Birmingham, have appointed Mr. F. W. CANTRILL as their representative in the Midlands and North of England.

The Degree of Doctor of Technical Science, *honoris causa*, was conferred recently on the veteran Mr. J. O. V. IRMINGER, R.D., formerly Chief Engineer to the Copenhagen Gas Department, by the Polytechnic Institute of that city upon the occasion of the celebrations of its centenary. Mr. Irminger will attain his 81st birthday this year.

The Earl of Malmesbury, Pro. Grand Master, last Wednesday invested Mr. R. W. EDWARDS, Managing Director of the Aldershot Gas, Water, and District Lighting Company, as P.G.S.D., Hampshire and Isle of Wight. Mr. Edwards is a Founder and P.M. of Palma Virtuti Lodge, No. 4187, and is at present in office for the fourth year as D.C. It has been resolved that the Annual Meeting of the Hampshire and I.O.W. Province shall be held at Aldershot in 1930.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

THERE was a more confident tone on the Stock Exchange last week, though no appreciable improvement in business was experienced. The continued loss of gold by the Bank again adversely affected investment stocks; but the absence of any increase in the Bank Rate acted as a check on the depreciation of values.

The dominating factor of the week was the interim dividend announcements of the Home Railway Companies. The substantial increase of the London, Midland, and Scottish was completely unexpected; and with the publication of the returns of the various companies, there was an immediate improvement in the stock quotations, increases of from 2 to 5 points being recorded.

The Gas Market, though a little more active than for the previous week, was still subdued. No increases were recorded in the quotations. It will be seen by the Table that, apart from the *ex* div. reductions, there were several stocks marked down, the principal being a fall of 10 points, to 365-385, in Imperial Continental capital stock, and there was also a drop of 1s., to 35s.-37s., in Primitiva ordinary. In common with other markets there was at the close of the week a general tendency to lower prices, and stock could be purchased below the average quotations.

The following transactions were recorded during the week:

MONDAY.—Commercial 99, 3 p.ct. deb. 56, Gas Light and Coke 19s., 19s. 1¼d., 19s. 3d., 19s. 4½d., 3½ p.ct. 64, 3 p.ct. deb. 59, Imperial Continental 372, 373, 378, 379, Primitiva 36s., 36s. 3d., 36s. 6d., 4 p.ct. deb. (1911) 81, South Metropolitan 104¼, 104⅜, Wandsworth, Wimbledon 5 p.ct. stock 114. Supplementary prices, Associated Gas and Electric "A" $61½, Reading 5 p.ct. 83½.

TUESDAY.—Bournemouth 6 p.ct. pref. 11$\frac{11}{16}$, 11$\frac{5}{16}$, Croydon sliding-scale 110, Gas Light and Coke 19s., 19s. 3d., 5 p.ct. deb. 98¾, Imperial Continental 365, 365¼, 368, 370, Newcastle 3½ p.ct. 17s. 6d., Primitiva 36s. 6d., 4 p.ct. con. deb. 81, South African 5, South Metropolitan 104, 6½ p.ct. deb. 100⅜, South Suburban 5 p.ct. 107, Tottenham 3½ p.ct. 106½. Supplementary prices, Bournemouth 7 p.ct. deb. 100½, Holyhead and North Wales 7s. 11¼d.

WEDNESDAY.—British 117, European 16⅜, 16$\frac{13}{16}$, Gas Light and Coke 19s., 19s. 3d., 3¼ p.ct. max. 62½, 62¾, 63$\frac{5}{8}$, 4 p.ct. pref. 76½, 76$\frac{5}{8}$, 76¾, 3 p.ct. deb. 59, 5 p.ct. deb. 99½, Imperial Continental 372, 372½, 373, Liverpool 7 p.ct. pref. 101¼, Newcastle 3½ p.ct. 17s. 1½d., Primitiva 36s. 6d., South Metropolitan 104, 104⅜, South Suburban 5 p.ct. 106, Southampton 5 p.ct. 79, Tottenham 3½ p.ct. 107, 107½. Supplementary prices, Bournemouth 7 p.ct. deb. 101½, Yorktown (Camberley) new 5 p.ct. pref. 92⅜, 93.

THURSDAY.—British 117, 118⅜, European 17⅜, Gas Light and Coke 18s. 6d., 18s. 7½d., 18s. 9d., 18s. 9¾d., 18s. 10½d., 19s. 3d. *ex* div., 4 p.ct. pref. 77 *ex* div., Imperial Continental 365, 367, 368, 370, 372, Primitiva 35s., 35s. 9d., South Metropolitan 104, 104⅜, South Suburban 5 p.ct. 104 *ex* div.

FRIDAY.—Aldershot "C" 72½, 73, British 5 p.ct. deb. 96½, Gas Light and Coke 18s. 7½d., 18s. 9d., 18s. 10½d., 19s., 19s. 1d., 3½ p.ct. max. 61¾, 3 p.ct. deb. 58½, 5 p.ct. deb. 98⅞, 99½, Imperial Continental 363, 365, 368, 372, Primitiva 35s. 6d., South Metropolitan 102½, 104½, Tottenham 3½ p.ct. 106.

In the Money Market gold continued to leave this country, and the position is undoubtedly one of anxiety. Loan rates were higher; and though towards the close fresh money was obtainable at 4 p.ct., the usual rate for both old and new loans was 4½ p.ct. A higher rate was paid for Treasury Bills, the average being £5 9s. 1·85d. p.ct., against £5 8s. 0·37d. p.ct. for the previous week.

In the Foreign Exchange Market, French francs were greatly in demand, and the rate closed at 123.74½. The New York rate rose sharply to 4.85⅝; Dutch florins moved in favour of sterling to 12.10; German marks and Belgas were unchanged at 20.35¼ and 34.90 respectively. Italian lire were quoted at 92.76, and Spanish pesetas at 33.26.

Silver was firmer, on demands from both India and China: at 24$\frac{7}{16}$d. per oz., while Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The Banks' deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3⅝ p.ct. at notice.

FORTHCOMING ENGAGEMENTS.

Aug. 13-14.—IRISH ASSOCIATION OF GAS MANAGERS.—Meeting in Dublin.

Sept. 12.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at St. Andrews.

Sept. 19.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General Meeting at Porthcawl.

Oct. 4.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—General meeting.

Oct. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Eastbourne.

GAS LIQUOR AND SULPHATE OF AMMONIA.

[Extracted from the Report of Dr. T. Lewis Bailey, Chief Inspector under the Alkali Works Regulation Act, for the year 1928.*]

There has been, speaking generally, satisfactory treatment of the noxious gases from ammonia plants, but one still occasionally finds oxide heaps that are in need of attention. It is not too much to expect that *always*, at installations provided with duplicate heaps, whenever there is the slightest sign of discoloration on the surface of the oxide, the foul gas should be directed to a fresh heap immediately. In the case of small works, using one heap only, the addition of fresh oxide to the heap may serve a sufficiently useful purpose for a short time only; the plant should really be closed down and a fresh heap made. Still, neither procedure should be necessary if a sufficient amount of oxide is provided at the outset to allow of the plant working through its full period. The provision of two heaps, with water-sealed change valve, is always to be preferred to a single heap.

There was a gassing accident at one coke oven plant, which fortunately was not fatal. Two saturators are provided on the plant (semi-direct type), and both were in use at the same time, one being used as a compensator. When it became necessary to reverse the operations there was some confusion in the manipulation of cocks, and gas escaped. Two duplicate saturators should invariably be kept distinct and there should be physical disconnection, otherwise accidents of this kind are very apt to occur.

At one gas-works sulphate of ammonia plant a serious leakage of foul gas was found, which was due to the removal of a wooden plug from the main near the purifiers. Easily removable plugs of this kind should not be used on mains at all; they are too frequently displaced accidentally, or they may fall out owing to corrosion of the inner end. In any case, a plug is not intended to be used for relief purposes in cases of some little irregularity in the working of the plant, and if easily removed plugs are provided there is apt to be improper use of them.

The difficulties with which many, particularly the smaller, manufacturers of sulphate of ammonia are faced do not decrease. This is reflected in the figures for the number of works registered during the year; 470 sulphate and muriate of ammonia plants only were registered, as against 501 in the previous year. The number of gas liquor plants fell from 78 to 75.

The cost of producing sulphate from ammoniacal liquor at a small gas-works is such as to become a charge on the manufacture of the coal gas; and the ammoniacal liquor, as such, has practically no value when considered as a possible saleable product. Disposal of it as an ordinary works effluent presents difficulties that prevent this means of getting rid of it from being a way out of the difficulty. The position has aroused discussion among those interested in gas manufacture, and this has brought up again the possibilities of direct or semi-direct manufacture of sulphate as applicable to gas-works. Also the manufacture of sulphate of ammonia from gas liquor at central establishments has been suggested. Obviously, large works can operate more economically than small works, but there arises the question of transport of the raw liquor from the works where it is produced to any such central establishments. This difficulty should not be insuperable; there would be entailed, no doubt, either prior concentration of the original weak liquor to higher strength at the works of origin, or the production of a higher strength ammoniacal liquor, in the first instance, in the coal gas plant. The latter point is one which is worthy of more attention than has been given to it. It is intimately connected with suggestions which have been made during the past few years for the working of gas plant in such a way as to obtain cleaner ammoniacal liquor, so reducing the difficulties of ammonia plant effluent disposal.

Reduction of the total volume of liquor produced, by doing the final scrubbing with sulphuric acid instead of with fresh water, has served a very useful purpose in a number of instances where sulphate of ammonia plants are available for the disposal of the acid liquor so obtained—this liquor being transferred to the saturator.

Apart from the economic question, the difficulty, so frequently experienced, of getting rid of the effluent from sulphate of ammonia plants continues to receive attention at the hands of the Sub-Committee of the Institution of Gas Engineers, who are exploring the practicability of methods suggested for improving the quality of ammoniacal liquors.

Meantime it may be well to indicate quite shortly what may be done fairly simply at works where the ammonia plant effluent disposal difficulty is acute and where extensive alteration to plant in general is not for the moment possible. The chief points to which attention may be drawn are:

(1) Devil-liquor, which invariably contains a very large proportion of the total phenol, can be evaporated by spraying it upwards in a hot chimney, or it may be evaporated by direct heating if the vapour can be taken to a steam boiler chimney, or a certain amount of it may be got rid of at producer fires. In such cases, however, the devil-liquor must be taken off from the hot end of the condensers, in order to ensure absence of hydrocyanic acid and sulphuretted hydrogen. If taken off cold, devil-liquors contain hydrocyanic acid and a good deal of sulphuretted hydrogen, in which case such treatment as that suggested should certainly not be adopted.

(2) Steps can be taken to maintain a properly regulated flow of spent liquor from the works throughout the year. The object to be aimed at is to maintain as nearly as possible a constant composition, as represented by its oxygen absorption factor, of the total sewage where this is treated bacterially. The bacteria are particularly sensitive to sudden changes in the composition of the sewage which they are called upon to treat. The oxygen absorption factor of an ammonia plant effluent is many times greater than that of ordinary town sewage, and, therefore, intermittent admixture of an ammonia plant effluent with the town sewage causes considerable fluctuations of the total sewage composition, with consequent trouble at the sewage treatment works.

A storage tank for spent liquor should be provided, and in order to minimize the size of such tanks it may be advisable to work the sulphate of ammonia plant in such a way that shut-down periods are of shorter duration than formerly, and actual working periods longer. This is usually quite feasible. This method of working the plant has, moreover, the very distinct advantage that a cleaner ammoniacal liquor is maintained in the well. For instance, an ammoniacal liquor which had an oxygen absorption of 500 parts per 100,000 when made, was found after remaining in the liquor well for four weeks to have an oxygen absorption of 850 (*see* 61st Annual Report, 1924, p. 17).

(3) As complete separation as possible of liquid from tar should always be effected at once—they should never be stored together.

As regards the constitution of gas liquors, work is being continued in our laboratory, as opportunity occurs, on the analytical side, in the hope that more light may be thrown on the nature of the constituents which give rise to the difference between total oxygen absorption of liquor and the sum of the oxygen absorption figures due to the known constituents. The difference figures vary widely, depending to some extent at any rate on the method of carbonization employed in the coal gas manufacture. This is a very wide field, and there is room for many workers.

Below are given the results of work which has been done in this direction during the past year.

NOTES ON THE ANALYSIS AND CONSTITUTION OF AMMONIACAL AND SPENT LIQUORS.

(*a*) *Action of lead compounds on the constituents of ammoniacal liquors.*—Ammoniacal liquors contain a good deal of sulphide, and it is desirable that this constituent be removed prior to the determination of the oxygen absorbed in the permanganate test. Though sulphides can be rapidly and completely removed by addition of solutions of lead salts, or by agitation with lead carbonate, it has been found that the values obtained for the oxygen absorbed after treatment with lead carbonate are usually much lower than corresponds with the removal of sulphide alone (64th Annual Report, 1927, pp. 24-26). Careful measurements have shown that after treatment with lead carbonate the decrease observed in the oxygen absorption (expressed as a percentage of the total) is about 5 p.ct. for liquors from horizontal retort systems, 20 p.ct. for liquors from vertical retort systems, and 30 p.ct. or more for liquors derived from low-temperature carbonization of coal. The reason for the discrepancy has been ascribed to limited, though specific, action of lead carbonate on certain of the polyhydric phenols in the liquor, and to partial oxidation of these constituents during the subsequent filtration. The latter effect cannot, under ordinary conditions, be entirely eliminated, since the alkalinity of the medium favours such oxidation, but it is difficult to believe that it is responsible for more than a small portion of the observed discrepancy, especially when filtration is accelerated by the use of a filter pump.

Removal of sulphide by means of a solution of a lead salt should not be attempted. Experiments in which a solution of a lead salt was added to (*a*) an alkaline and (*b*) an acidified liquor

* Published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2; price 1s. net.

showed that the resulting precipitates contained polyhydric phenols, presumably present as sparingly soluble lead salts, and that the precipitate in case (*a*) contained about one-third of the sulphur not present as sulphide or sulphate. It has been found that both thiosulphate and thiocyanate are considerably precipitated as basic salts under these conditions.

In an attempt to explain the anomalies observed after treatment with lead carbonate, solutions of various constituents and probable constituents of ammoniacal liquors were agitated for an hour with lead carbonate, using as solvent a 1·25 p.ct. solution of ammonia; 250 c.c. of solution and 10 grammes of lead carbonate were used in each case. After settling, suitable aliquot parts were withdrawn for analysis. Except when catechol was determined colorimetrically, the agitation of solutions containing polyhydric phenols was effected in an atmosphere of gas coal.

The following results were obtained:

Constituent.	Initial Concn. (Gramme per 100 C.C.)	P.Ct. Removal by Lead Carbonate.	Analytical Method.
Thiocyanate	0·116, as CNS	0	Titration, N/10-Ag.
Thiosulphate	0·064, as S	0	Titration, N/10-I.
Catechol	0·200	98·5	Colorimetric
Catechol	0·100	100	3 min. O/A test
Resorcinol	0·100	0·5	,, ,, ,,
Hydroquinone	0·100	7·0	,, ,, ,,

It would appear, therefore, that the observed discrepancy is due to the removal of substances of the catechol type, this being complete on prolonged agitation. Removal is not repressed to any considerable extent by neutralization of the liquor, since a 92 p.ct. removal was observed with a 0·2 p.ct. neutral solution after an hour's agitation. It is possible that this behaviour is characteristic of the *o*-dihydroxy grouping, and such evidenec as is at present available would appear to support this. Experimental work is still in progress in the laboratory, and especial attention is being directed towards the influence of the constitution in determining the behaviour of phenols and their derivatives towards metallic salts in general and lead carbonate in particular. It is hoped in this way to obtain information which will enable conclusions to be drawn regarding the constitution of the higher tar acids present in ammoniacal liquors.

The small decrease in the oxygen absorption observed with hydroquinone is conceivably due to unavoidable oxidation during the necessary manipulations.

That amount of soluble lead in the final solutions varied from 0·0002 to 0·0004 grammes of PbO per 100 c.c.

(*b*) *Determination of the oxygen absorbed by ammoniacal liquors.*—Since it is obvious that removal of sulphide by lead carbonate prior to the determination of the oxygen absorbed is inadmissible, alternative methods of procedure must be adopted. The two following are possible: (i.) Removal of sulphide by other means; (ii.) determination of the total oxygen-absorbing power of the untreated liquor, correction being subsequently applied for the effect produced by the contained sulphide by means of a determined factor. The latter procedure was fully discussed in the 64th Annual Report, 1927, p. 25. Removal of sulphide is, however, preferable from several viewpoints, and research has been directed to this end.

The obvious line of attack is to make use of the insolubility of certain of the metallic sulphides. A careful survey of the properties of the compounds of various possible metals narrows the choice down to zinc and cadmium, various factors suggesting that salts of the former metal will be the more suitable.

The first experiments were directed towards comparing the rates of removal of sulphide from ammoniacal solutions by lead carbonate and zinc oxide. About 200 c.c. of a solution of ammonium sulphide (H_2S = 0·17 p.ct.) were shaken for five minutes with 10 grammes of lead carbonate and zinc oxide, respectively. It was found that under these conditions lead carbonate removed 99·5 p.ct. of the sulphide, and zinc oxide 77 p.ct. In addition, the rate of settling with zinc oxide was slow, and filtration tedious. Sulphide was, however, completely removed by addition of a solution of zinc sulphate to the neutral, or faintly acid, solution.

The following method is, therefore, suggested for the removal of sulphide from ammoniacal liquors, prior to the determination of the oxygen absorbed; 100 c.c. of liquor are pipetted into a 250 c.c. graduated flask and about 100 c.c. of distilled water are added. The whole is made just acid with 30 p.ct. sulphuric acid and calcium carbonate added to neutralize the free acid. When reaction is completed, 20 c.c. of a solution containing 250 grammes of zinc sulphate crystals per litre are added. The volume is then made up to 250 c.c., and the contents of the flask are thoroughly mixed by 10-20 inversions. For precise determinations the precipitated zinc sulphide should be allowed to settle overnight, and 5 c.c. of the clear supernatant liquid withdrawn by a pipette and diluted to 100 c.c. with good distilled water. For the determination of the oxygen absorbed by the permanganate test, 5 c.c. of this dilute solution (0·1 c.c. of original liquor) are taken for the 3-min. test, and 10 c.c. (0·2 c.c. of original liquor) for the 4-hr. test. For details regarding the carrying out of these tests see 64th Annual Report, 1927, p. 21. For ordinary purposes it is sufficient to allow the precipitated zinc sulphide to settle for 15-20 minutes, and then to filter; 5 c.c. of filtrate being diluted as indicated. Since the solution is neutral there is no risk of oxidation of phenolic substances during filtration.

As an example of the accuracy of the method, the following experiment may be quoted: An effluent spent liquor containing 0·188 p.ct. of thiocyanate (as CNS), 0·128 p.ct. of thiosulphate (as S), and 0·214 p.ct. of monohydric phenols (as phenol), was diluted with (*a*) an equal volume of water, and (*b*) an equal volume of ammonium sulphide solution. Apart from sulphide, the oxygen absorbed by these two resulting solutions is identical. Solution (*b*) was treated as described above, and the following results were obtained:

—	Oxygen Absorbed in Permanganate Test.	
	3-Min. Test.	4-Hr. Test.
Solution (*a*), untreated	295	365
Solution (*b*), after zinc sulphate treatment	293	363

(*c*) *Determination of thiosulphate and sulphide in ammoniacal liquors and spent liquors.*—In neutral solution the polyhydric phenols react with iodine. This reaction cannot be used for their determination since experiments have shown that there is, in general, no simple linear relationship between the amount of polyhydric phenol present and the amount of iodine taken up in a given time. It has been found that under comparable conditions the amounts of iodine taken up in a given time by catechol, hydroquinone, resorcinol, and pyrogallol increase in the order given; the rate of reaction between iodine and pyrogallol being fairly rapid. These facts would suggest that when certain of the more reactive of the polyhydric phenols are present, the customary method for the determination of thiosulphate and sulphide might lead to results which are too high. The method for the estimation of these constituents given in the 64th Annual Report, 1927, pp. 19 and 23, stresses that the diluted liquor should be acidified before titration with iodine; and the following experiments were therefore made in order to ascertain whether the tendency of polyhydric phenols to react with iodine is repressed in acid media.

5 C.C of N/10 Thiosulphate in each Case; Dilution to 150 C.C.

Polyhydric Phenol Added.	Amount, Grammes.	Concentrated HCl, C.C.	N/10 Iodine Used, C.C.
None	..	*Nil*	5·0
None	..	2	5·0
Pyrogallol	0·04	*Nil*	5·6
,,	0·04	1	5·05
,,	0·04	2	5·0
Resorcinol	0·1	2	5·0
Hydroquinone	0·1	2	5·0

The following data were obtained by titration with N/10 iodine of 20 c.c. of an effluent spent liquor diluted to 150 c.c. under various conditions.

Condition of Titrated Solution.	N/10 Iodine Used, C.C.
Neutral	3·6
Faintly acid	2·6
,, 0·5 c.c. conc. HCl	2·5
,, 1 c.c. ,, ,,	2·4
,, 2 c.c. ,, ,,	2·4

These experiments indicate that when the solution to be titrated is made distinctly acid by addition of mineral acid (sulphuric or hydrochloric) trustworthy values for the thiosulphate and sulphide content are obtained by titration with a solution of iodine.

(*d*) *Note on the constituents responsible for the difference figure.*—It is generally accepted that the difference figure of the oxygen absorption—*i.e.*, the difference between the oxygen absorption actually observed and the sum of the effects due to the known constituents—is largely accounted for by the presence of polyhydric phenols in the liquor; but there is at present no reliable information as to the precise chemical nature of these substances. Such information as is available would indicate that catechol (or, more probably, homologues of catechol) is undoubtedly present.

The difference figure represents about 10 to 20 p.ct. of the total oxygen absorbed by horizontal retort liquors, 30 to 50 p.ct. of that absorbed by vertical retort liquors, and up to 60 p.ct. of that absorbed by liquors derived from the low-temperature carbonization of coal.

Since the difference figure is considerably reduced after treatment with lead salts, careful measurements were made of the

sulphur content of an ammoniacal liquor and of an effluent spent liquor to determine whether any portion of this figure is due to the presence of mercaptans or other similar organic sulphur compounds. 50 c.c. of liquor were slowly delivered from a pipette under the surface of 50 c.c. of concentrated nitric acid, and the whole was evaporated to dryness on a water bath. The residue was taken up in dilute hydrochloric acid and again evaporated. The final residue was dissolved in hot dilute hydrochloric acid, and, after filtration, the sulphate was precipitated as barium sulphate. Owing to the presence of nitro-compounds the final solution was of a bright yellow colour.

—	Ammoniacal Liquor.	Spent Liquor.
Sulphur present as sulphate, p.ct. . .	0·018	0·020
,, ,, ,, sulphide, p.ct. . .	0·099	..
,, ,, ,, thiocyanate, p.ct. .	0·138	0·149
,, ,, ,, thiosulphate, p.ct. .	0·124	0·080
	0·379	0·249
Total sulphur found, p.ct. . .	0·390; 0·391	0·252

Considering the data for the spent liquor, it is seen that the total sulphur actually present is almost quantitatively accounted for by the sulphate, thiocyanate, and thiosulphate. With the ammoniacal liquor, however, there is a not inconsiderable difference. There is, however, the possibility that in the ammoniacal liquor there are thio-salts other than those indicated above. The close agreement in the case of the spent liquor indicates that, if organic sulphur compounds are present, they are present in negligibly small quantity.

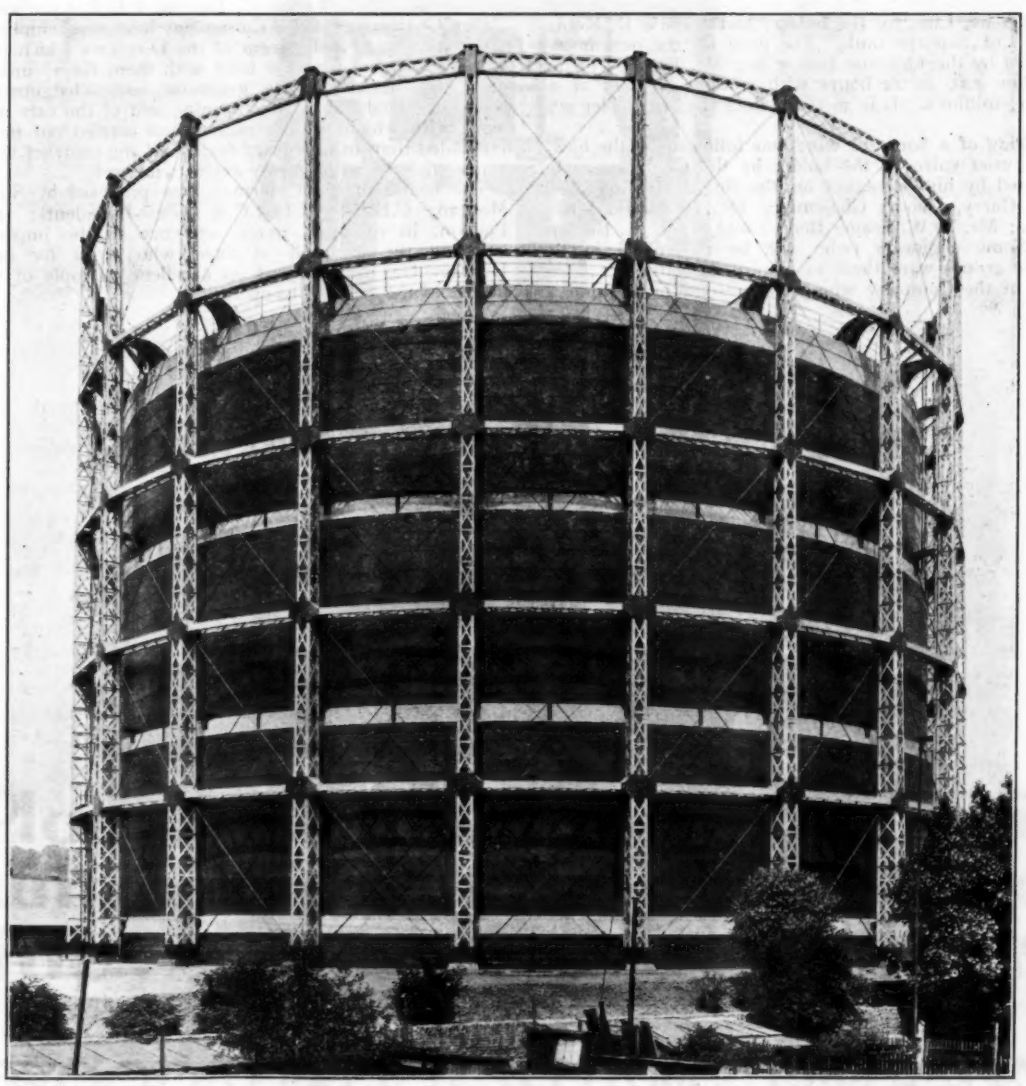
In section (*a*) it is shown that catechol is practically quantitatively precipitated when ammoniacal solutions are agitated with an excess of lead carbonate, and consequently the reduction in the difference figure after such treatment is a measure of the content of substances of the "catechol" type. As stated, reseach is being directed towards obtaining a more satisfactory definition.

Careful measurements, in which various liquors were analyzed and the oxygen absorption determined before and after agitation with lead carbonate, have shown that with liquors derived from horizontal retorts 30 p.ct. of the difference figure is due to substances of the catechol type, and with liquors from vertical retorts 50 to 60 p.ct. One liquor derived from the low-temperature carbonization of coal was examined, and substances of the catechol type were found to be responsible for half the difference figure.

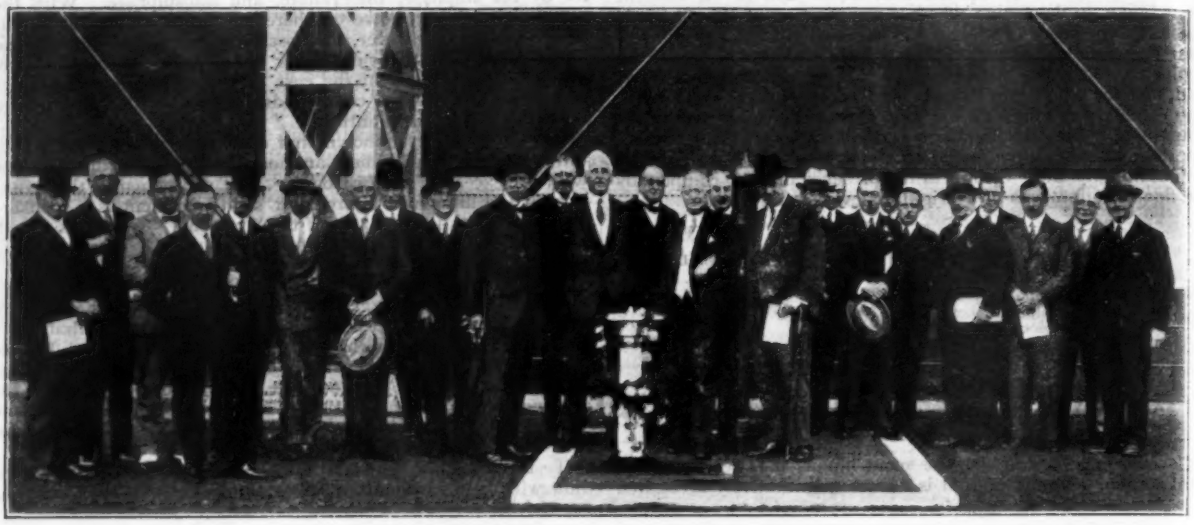
Tests for hydroquinone in the supernatant liquid after agitation with lead carbonate have so far yielded negative results.

INCREASED STORAGE FOR HORNSEY.

Inauguration of a Three Million-C.Ft. Holder.



The Hornsey Gas Company, under the leadership of Mr. A. M. Paddon, M.Inst.C.E., as Chairman, and of Mr. Joseph W. Buckley, M.Inst.C.E., as Engineer and General Manager, have built up for themselves a great reputation for good service and cheap gas; and to enable them the better to meet the demands upon them which are the natural reward of these attributes they have provided themselves with a new 3-million c.ft. holder. This has now been completed, and its inauguration recently was fittingly celebrated. It is a four-lift guide-



AT THE HORNSEY INAUGURATION.

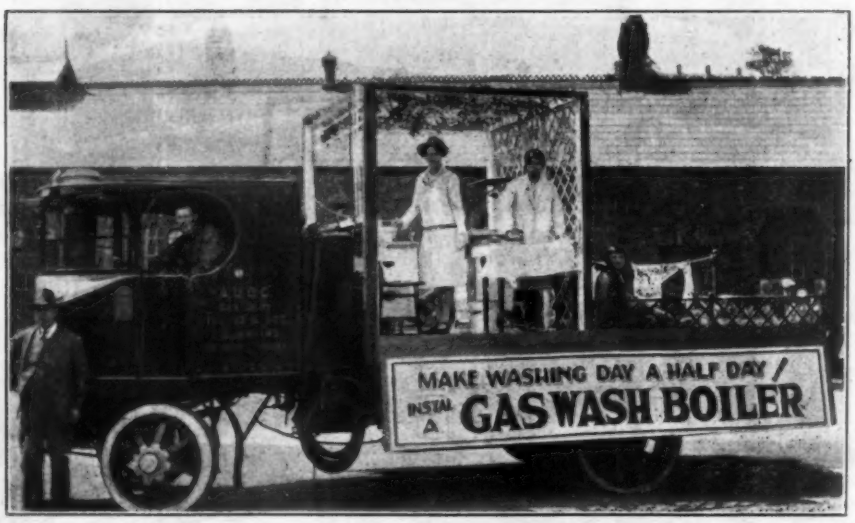
framed holder, in a tank constructed of mass concrete with reinforcing steel bands. Mr. Buckley was responsible for its design and construction; and the contractors were Messrs. S. Cutler & Sons, Ltd., for the holder, and Messrs. R. Robinson & Co., Ltd., for the tank. The need for the new holder is exemplified by the fact that last winter Mr. Buckley turned out 4½ million c.ft. in 24 hours with storage capacity of no more than 1¼ millions. It is 36 years since the last holder was erected.

The breaking of a bottle of wine was followed by the opening of the outlet valve of the holder by the Chairman, who was supported by his colleagues on the Board of Directors—Mr. G. W. Carey, Deputy Chairman; Mr. Frank H. Jones, M.Inst.C.E.; Mr. T. W. Seager Berry; and Mr. E. L. Burton, F.S.A.A. Some engineers (who will be recognized in the photographic group) were there to admire the structure; and the officers of the Company who were present, in addition to Mr. Buckley, included Messrs. K. Leslie Mortimore, A.C.A. (Secretary), K. Gandon (Assistant), F. Franks (Engineering Draughtsman), and Hyde C. Burton, F.C.A. (Auditor).

The Chairman, at the subsequent luncheon, emphasized the great confidence and esteem of the Directors which is enjoyed by Mr. Buckley, who has been with them for so many years; and Mr. Buckley made generous acknowledgment of the assistance rendered by Mr. Franks, and of the care and excellence with which the contractors had carried out their work. He added that an important feature of the contract was that it was completed without any extras whatever.

The health of the Chairman was proposed by Sir Charles Morgan, C.B.E., M.Inst.C.E. (Past-President); and Mr. Paddon, in response, made reference to the importance of enlisting the goodwill of those who work for one. The Hornsey Gas Company is an excellent example of the beneficence of the spirit of co-operation.

A WINNING CARNIVAL EXHIBIT AT ABERTILLERY.



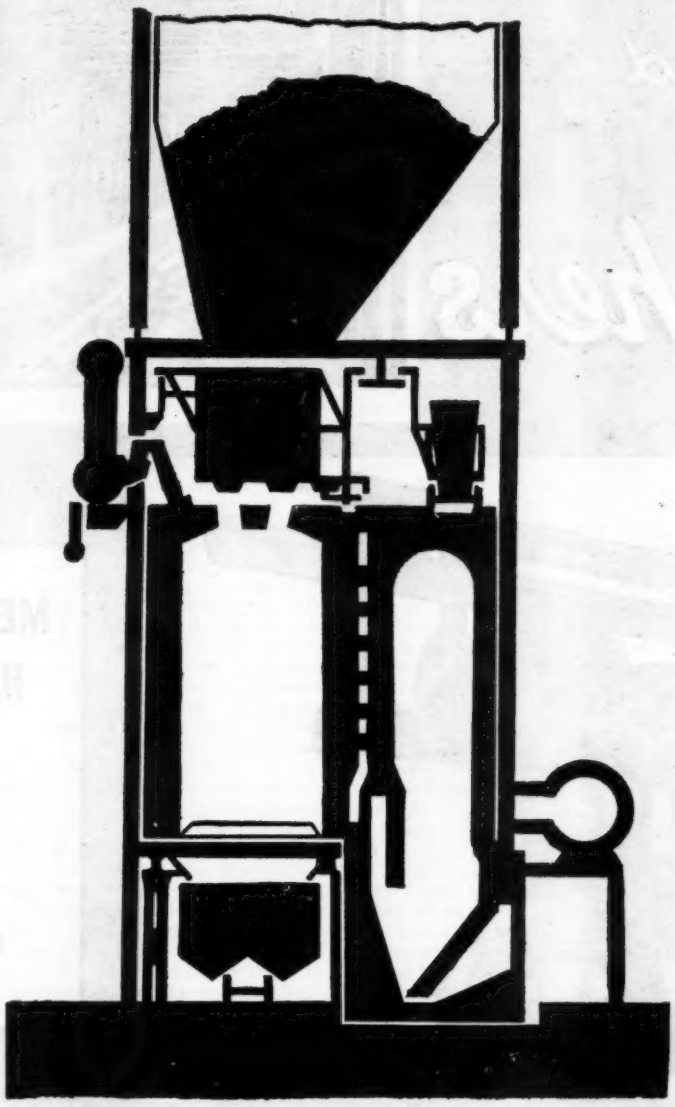
The accompanying photograph shows the exhibit of the Abertillery Gas Department, which gained first prize at the Local Hospital Carnival on Saturday, July 13.

The exhibit consisted of a scullery and kitchen garden, and was coloured in green and white. The scullery was fitted with a cooker, "Wonder" washing machine, and an ironing table, and the actual operations of washing and ironing carried out *en route* created a great deal of interest. The gas supply for the iron and washing machine was obtained from a high-pressure cylinder. People were greatly attracted by the neat little garden with its miniature lawns, flower beds, tarmac path, and line full of drying clothes.

The poster at the back of the lorry read, "Washed, dried, and ironed in record time. Thanks to gas." The Gas Department have received many compliments on the attractive yet practical display presented.

W-D

WOODALL-DUCKHAM INTERMITTENT VERTICAL CHAMBERS



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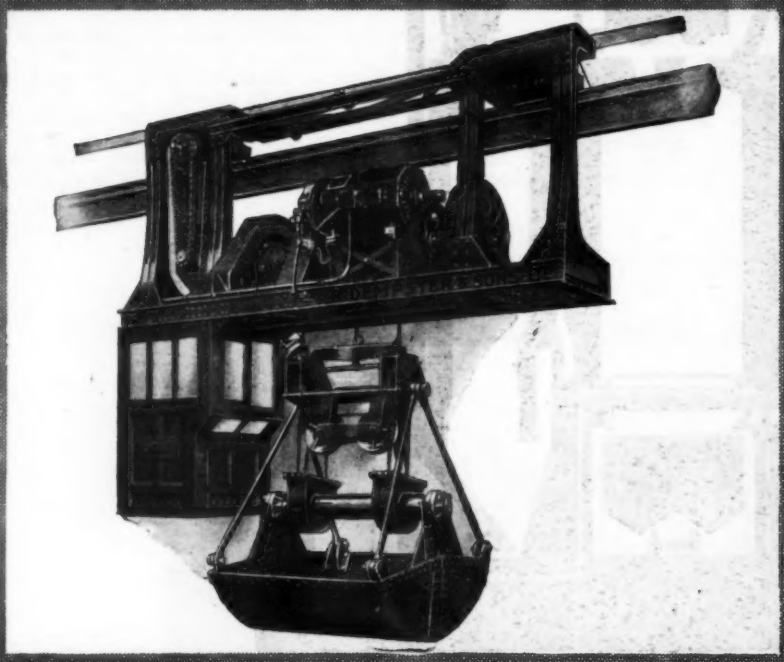

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NEW CARBONIZING INSTALLATION FOR THE GAS LIGHT AND COKE COMPANY'S WORKS AT BECKTON.

Installation of Koppers Coke Ovens to be Erected.

Considerable interest was aroused at the World Power Conference held in London last autumn by the announcement made by Sir David Milne-Watson during the course of a luncheon given to the delegates at the Gas Light and Coke Company's Offices, to the effect that his Company were considering the erection of bye-product coke ovens at their Beckton Works. It will come as no surprise to those who know the methods of the Gas Light and Coke Company that, in putting this proposal into practice, the greatest possible precautions have been taken to ensure that the proposed coke oven plant shall be not merely up-to-date, but of the best and most dependable design in every particular. The Engineers of the Gas Light and Coke Company have visited America, Belgium, France, and Germany, as well as plants in this country, in their investigations into modern bye-product coking practice. After this preliminary survey it was decided to call for tenders for a first installation having a capacity of 1200 tons of Durham gas coal per day, this being the first of four similar units which when complete will form one of the largest carbonizing installations of its kind, and probably the finest.

We are now able to announce that the contract for the first plant of 1200 tons capacity has been given to the Koppers Coke Oven Company, Ltd., of Sheffield. This Company, as is well known, have wide experience of gas-works plant, both in connection with the erection at gas-works of large plants of the coke oven type known technically as chamber ovens, and in connection with the well-known Koppers continuous vertical chamber oven.

The coal will be brought to the handling plant direct from the Company's riverside unloading plant by an "I.R." belt, or from storage by locomotive in trains consisting of sixteen trucks, all sixteen trucks being simultaneously unloaded into receiving hoppers of 200 tons capacity. The coal will then be taken by an "I.R." belt conveyor to a "Bradford" breaker and subsequently to hammer mills. The crushed coal is conveyed to a mixing bunker of 600 tons capacity, consisting of three compartments fitted with suitable arrangement for intimately mixing three kinds of coal. The mixed coal is conveyed by belts to the service bunker. The whole of the motors are push-button controlled, so that they may be set in motion or stopped from various points on the plant; correct sequence in the control being maintained by contactor gear. From the service bunker, the coal will feed into a charging lorry running along the top of the ovens; and as the ovens are entirely top charged, no coal compressing machinery is installed.

The ovens are of the Koppers twin flued type, with cross-over regenerators, which embodies the well-known Koppers regenerative system, with the advantages of the twin flue construction. It is hoped to publish in our columns shortly a full description of this new type of Koppers oven. The installation will consist of 60 ovens arranged in two batteries of 30 ovens in each, each oven having a capacity of 16 tons of coal per charge, and being designed for a burning time of not more than 19 hours, thus allowing the plant to carbonize up to 21 tons of air-dried coal per oven per day. The ovens are 18 in. in width, 38 ft. 4 in. in length between doors, and 14 ft. high. Self-sealing doors are to be installed; the advantage of these doors being that they can be made gas-tight without luting.

The ovens will be of the combination type, and can be heated alternatively by coal gas or by producer gas. It is intended that generally producer gas shall be used for heating; and a separate producer installation consisting of nine Koppers automatic producers is included in the scheme. These producers will gasify coke breeze and will produce sufficient steam from the hot water surrounding the jackets to leave a surplus after satisfying the low-pressure steam requirements of the producer plant. The producer gas is to be cleaned so that it contains only very small quantities of dust. The cleaning is effected in a water spray washer, a separate washing plant being provided for each producer. The washed gas is slightly preheated before entering the oven heating mains, in order to prevent the deposition of moisture. A holder of 200,000 c.ft. capacity is provided for the producer gas. The producers are fitted with automatic ash discharge, a telpher track being installed for the disposal of the ash. The use of outside producers for gas-making plant has the advantage that the silica brickwork of the construction is given a much longer life than is possible with built-in producers. It would not, of course, be possible to use built-in producers with coke ovens. The producer gas used for heating the ovens is metered.

After carbonization is complete the coke is discharged from the ovens by a ram of very substantial construction. The coke is to be discharged on to a coke car in which it is run to a central quenching station; the quenched coke being subsequently discharged on to a coke wharf, from which it is taken to the Company's coke grading plant. Special provision is made for eliminating smoke and dust nuisances during charging.

Two ascension pipes are installed on each oven, from which the gas is drawn into two gas collecting mains, one at each side of each battery. The gases from the ovens are then conveyed to the bye-product plant in the usual manner, and are partially cooled in the primary coolers according to a system evolved by the Research Laboratories of the Gas Light and Coke Company.

The gases are then taken through one of two high-speed steam turbine driven exhausters, and are subsequently passed through secondary coolers, where their temperature is reduced to atmospheric. Following the coolers is a tar extraction plant consisting of three "P & A" extractors, one of which is a stand-by, after which the gas passes to the ammonia washers for further purification by the indirect system commonly practised at gas-works. It was considered inexpedient to include the usual Koppers semi-direct process in this instance, because the whole of the ammonia liquor from the Beckton Works is sent to the Company's own tar works adjoining, to be worked into sulphate of ammonia. Following the ammonia washers, the gas is to be sent to the purifiers. Adequate control apparatus and governors of the most up-to-date design are to be installed throughout the plant, and scientific instruments for continuously recording temperatures and pressures at all salient points are also to be included.

The whole of the plant is arranged to be as nearly as possible independent of failures of the human element, and special attention has been paid in every detail to attainment of the most economical working. Nothing has been spared to ensure that the minimum number of men shall be required for operation and that the plant shall be operated with the minimum requirements of electric power and steam and with the lowest possible consumption of water.

It will be felt by many in the gas industry that the initiation of so large an experiment in the manufacture of town gas is in itself a notable tribute to those directing the policy of the Gas Light and Coke Company. The first battery of coke ovens to be erected in connection with gas-works in this country was at Birmingham in the year 1912, where 66 Koppers ovens were installed having an aggregate carbonizing capacity of 450 tons of coal per day. Though the erection of coke ovens upon American and Continental gas-works has been fairly common practice for many years, a variety of reasons has combined to prevent the adoption of this practice in England. Rightly or wrongly, it was felt by many gas engineers that the Birmingham installation was erected somewhat before its time in this country. The British gas industry is more advanced than that of the Continental and American gas industries, and the coking plant which could be erected seventeen years ago was very much less efficient, particularly as regards solidity of construction and labour-saving devices in the mechanical handling of coke, &c., than is the case to-day. In view of the greatly improved design of modern bye-product coking plants, it is confidently anticipated that the working results of the new installation at Beckton will show that this departure from normal gas-works practice by the Gas Light and Coke Company will be amply justified.

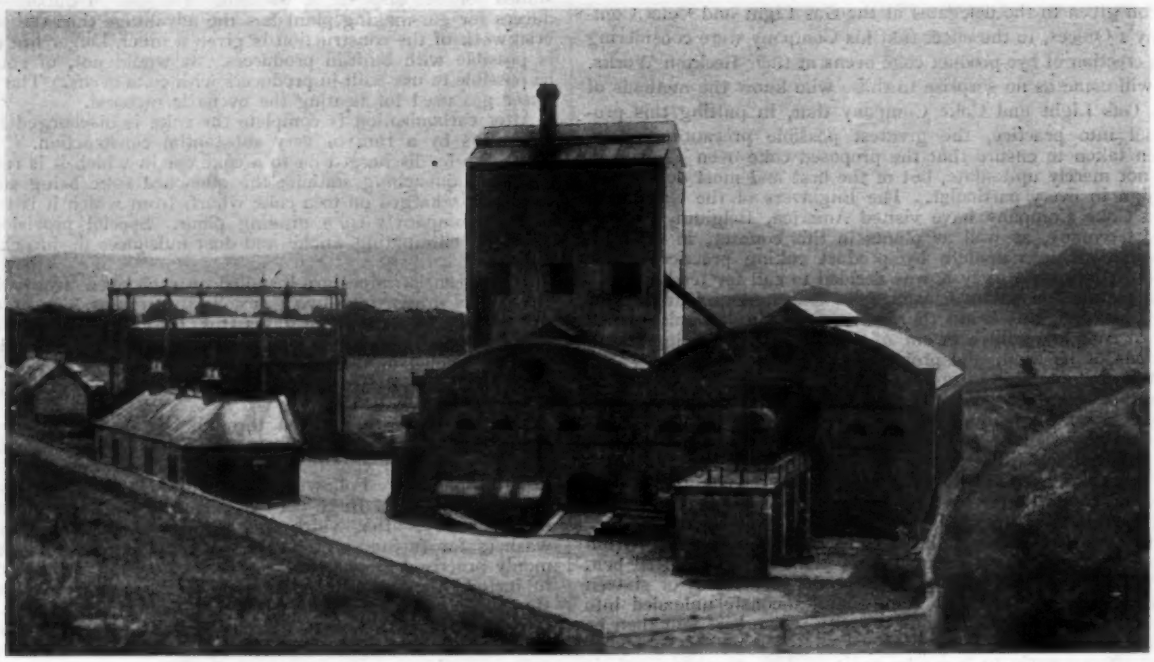
Ceramic Society.—The autumn meeting of the Refractory Materials Section and the Building Materials Section of the Ceramic Society will be held in London in September. The meeting will also be a re-union of those who took part in the visit to the United States and to Canada; and in this connection Mr. F. West will give a special paper to both Sections, entitled "Notes on the American Trip," which will be illustrated with lantern slides and a cinematograph film.

Bending Glass.—In bending glass tubing of wide bore, there is difficulty in preventing the collapse of the wall. Ray N. Allen ("Philippine Journal of Science"), however, points out that if dry asbestos fibre be pressed tightly into the tube where the bend is to be made, then the glass can be heated and bent without its collapsing, the soft glass being supported by the asbestos core, which later can be picked out with a wire.—"International Sugar Journal."

GLOVER-WEST VERTICALS AT PEEBLES.

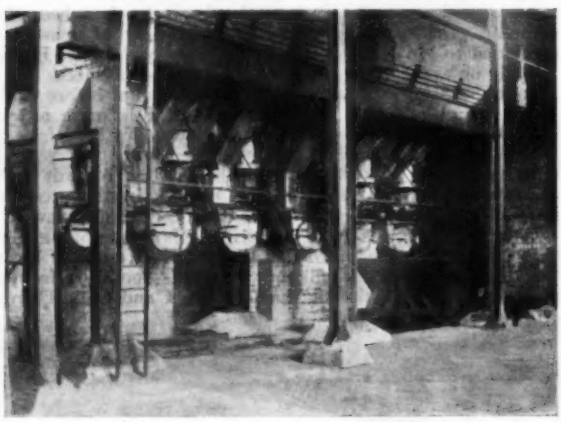
An Interesting Installation.

[From the July Issue of "West's Gas."]



Gas lighting in Peebles was introduced in 1829, just a hundred years ago, and in laying out the present works in 1904 it was decided to remove the gas-works from its central position in the town to a new site about one mile east, which would preserve the amenity of the burgh. In 1928, to compete with the electrical supply and to extend carbonizing plant, it was agreed to instal vertical retorts. The installation, capable of a daily output of 450,000 c.ft. of 475 B.Th.U. gas, is placed inside the horizontal retort house, and comprises six Glover-West 40-in. steaming-type retorts 25 ft. long, in silica material, arranged in units of ones in one single line, with two producers of the step-grate type, each capable of supplying fuel gas to four retorts.

The plant is erected upon a mass concrete foundation, immediately adjacent to the steam-generating plant at right



A View below the Retort Bench.

angles to the overhead railway gantry, inside the horizontal retort house.

Coal is brought into the works in bottom-opening wagons, and deposited from the overhead gantry into a 10-ton receiving hopper, whence it is directed to the overhead storage bunkers by means of an electrically driven West lip-bucket conveyor, which encircles the retort house.

Coke, immediately it is discharged from the retorts, is dealt with by the same conveyor running below retort-house floor level, and elevated to an overhead storage bunker arranged to supply wagons, producers, and retorts. Coke can also be wheeled away to the yard in tipping barrows provided. Screens are fitted in the chutes to wagons and producers, and the breeze from each is led to the boilers through suitable ducts.

The coke extractors can be operated either by a totally enclosed electric motor or by steam engine, one acting as stand-by to the other, both enclosed in a steel-framed and brick engine house. The lay-out of the vertical retorts has been so designed, in conjunction with the other plant, that one man per shift can comfortably deal with the carbonizing and remaining works duties.

The annual output of the Peebles Works is 54 million c.ft., of which 10 p.ct. is industrial load, 23 p.ct. ordinary, 64 p.ct. prepayment, and 3 p.ct. public lighting.

The erection of the new vertical retort installation was commenced in July of last year, and was put to work this year on Jan. 23. A period of seven days under working conditions, recently observed, showed the following returns:

Observed period	7 days.
Number of retorts in action	2
Total coal carbonized	69 tons 4 cwt.
Coal used	60·5 p.ct. Arniston doubles. 39·5 p.ct. Lothian doubles.
Coal throughput per retort per day	4·95 tons.
Make of gas per retort per day	75,850 c.ft.
Make of gas per ton of coal	15,347 c.ft.
Quality of gas	475 B.Th.U.
Yield in therms per ton of coal	72·88
Total coke made	38 tons 1 cwt.
Yield of coke per ton of coal	11 cwt.
Fuel to producers—	
Weight of coke per 100 lbs. of coal carbonized	16·0 lbs.

Mr. L. Farquhar, the Gas Department's Engineer and Manager, under whose direction the scheme was prepared and carried out, is to be congratulated upon the success which has attended his efforts.

C. A. P.

"C.O.L." CHAMBER OVENS AT THE WORKS OF THE WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

Description and Operation Results of 3 Million C.Ft. per Day Plant.

By C. M. CROFT, M.I.Mech.E., F.C.S., Chief Engineer and General Manager of the Wandsworth, Wimbledon, and Epsom District Gas Company.

The installation of intermittent vertical chamber ovens ("C.O.L. System") at the works of the Wandsworth, Wimbledon, and Epsom District Gas Company, supplied by Chamber Ovens, Ltd., of 39, Victoria Street, S.W. 1, was subjected to an official guarantee test of 28 days from Nov. 19 till Dec. 16, 1928. No special test conditions were, however, imposed upon the plant, so that the results obtained may be regarded as typical of every-day working. The main results obtained and a brief description of the p'ant are given below.

CHAMBER PLANT.

This plant, which was constructed according to the principles of Pintsch and Dr. Otto, Berlin, and for which Chamber Ovens, Ltd., are the sole British Licensees, is housed in a previously existing retort house, and consists of five settings of six chambers, each holding three tons of coal; the capacity of the plant thus being 180 tons per day when working on 12-hour charges (fig. I.).

The chambers, which are of silica and constructed of tongued and grooved blocks, have a cross-section of approximately rectangular form, with rounded corners and sides slightly cambered. There is a uniform taper throughout the height of 20 ft., the average width is about 10 in., and the average breadth about 9 ft. These are carried on cast-iron sole plates, supported in turn upon a framework of built-up riveted plate girders. The overhead coal and breeze bunkers are carried over two of the six chamber settings on six of the main bench stanchions, reinforced for the purpose. The bench bracing consists of powerful steel ties and buckstays; the upper longitudinal ties being provided with steel spring expansion buffers.

The chamber bottom doors are provided with metal-to-metal joints (the upper joint ring being bolted to the cast-iron sole plates) and are of especially strong construction. They are operated hydraulically from an accumulator plant working at a pressure of 40 atmospheres. Each setting is provided with a hydraulic cylinder and piston which perform the operation of opening and closing the bottom doors of the chambers in the particular settings; no manual effort on the part of the attendant, apart from the opening and closing of the control valve, being necessary. The movable-covers of the door are of mild steel, upon which are bolted a number of cast-iron domes which protect the cover itself and reduce radiation.

The recuperators preheating the secondary air and producer gas are built up of tongued and grooved tiles of fireclay material. The heating of the chambers is accomplished in four combustion flues situated one above the other between the coal chambers, the burners for which are provided with gas and air nostril blocks of special design situated alongside each other. Both the gas and the air may be closely regulated by means of fireclay dampers, and the gas to each chamber is further regulated by metal valves in the producer gas main. Sight boxes for observation and control of the combustion chambers and recuperators are provided throughout the plant.

To reduce radiation and to make the working conditions as comfortable as possible, insulating bricks and moler earth are built into the outer walls of the setting and on the bench top respectively, while the sole plates beneath the combustion chambers are also insulated.

Attention may be drawn to the patent end wall construction shown in fig. II., which effectively prevents fissuring of the brickwork on expansion when heated up. The walls, indeed, remain absolutely solid and intact.

PRODUCER PLANT.

The chamber oven plant is provided with external gas producers (fig. III.). The producers, which are of Power-Gas Corporation, Ltd., design, consist of two Lymn-Rambush patent mechanical grate units with automatic ash discharge, of 8 ft. 6 in. internal diameter, designed to gasify 15 tons of fuel each per day. These are steam boiler jacketed—the pressure of the steam raised in these boiler jackets and in the waste-heat boilers, through which the hot producer gases pass after leaving the producers, being 130 lbs. More steam is raised than is required for the running of the auxiliary machinery and the steaming of the charges in the vertical chambers; and the balance is passed into the works main. The exhaust steam from the auxiliary machinery is utilized for saturating the blast, live steam being introduced as well when required. After passing through the waste-heat boilers, the partially cooled gas enters the Lymn patent static gas washer-coolers (one per unit), and passes counter-current to a stream of cooling water falling over truncated cones and discs. The temperature of the gas leaving the washers approximates that of the inlet water. Finally, before leaving the plant, the gas is passed through a centrifugal cleaning fan into which water is injected, for final cleaning. The cool and clean producer gas is supplied to the chamber oven plant by a 24-in. steel main; separate cast-iron valves with adjustable scales being provided for each of the 35 groups of combustion chambers (fig. IV.).

METHOD OF HEATING.

The producer gas is preheated in the recuperators of the carbonizing plant by the outgoing hot waste combustion gases, which, at the top of the bench, divide into two streams, one for the upper section in which the secondary air is preheated, and the other for the lower section in which the producer gas is preheated. The preheated producer gas and secondary air meet and burn at several nostrils situated at different levels up the chamber, thus providing means of accurately regulating the heat of the chamber, and the combustion gases make their way upwards, travelling backwards and forwards through heating flues to the top of the chambers, where they pass over to the recuperators and thence to the main flue. Dampers in each of the horizontal heating flues enable even heating and carbonization of the coal charges to be effected. Control of the quantities of producer gas and secondary air supplied to the group of four combustion chambers is simple, as they are regulated in the first case by a valve on the producer gas main and in the other by a metal slide with screw and graduated scale.

After passage through the recuperator, the waste gases enter the main flue situated under the bench, and pass to the chimney.

BENCH AUXILIARIES.

The coal and coke breeze bunkers are of steel plates, each having two outlets and valves for filling the coal bus. The side walls of the bunkers are brick lined. The coal bunker has a capacity of 100 tons and is provided with two 30 tons per hour bucket elevators, while the breeze bunker has a capacity of 25 tons and is supplied by a skip hoist capable of elevating 10 tons per hour.

The coal bus from which the chambers are charged runs along the top of the bench and has a capacity of about 3·2 tons. It is constructed of rolled-steel sections and steel plates, and is carried on a bogey with four cast-iron wheels fitted with roller bearings. The bus is electrically driven by means of an enclosed motor and is fitted with an operator's platform and controller. In the event of a breakdown of the electricity supply, the bus is also provided with gears for its easy hand operation. Auxiliary hoppers on the bus carry the supply of coke breeze necessary for covering the bottom doors of the chambers when charging. The bus rails are of heavy flanged sections.

The charging of the chambers is carried out from the top through charging ports provided for the purpose. Three top ports are provided for each chamber, each having a cast-iron frame and self-sealing cover (fig. V.). For the actual charging of the chambers, only the two outer ports are utilized, while the middle one serves for the escape of any fumes generated during charging—the bulk of these fumes being carried outside the building by a chimney on the bus and patent fume manifold exhaust pipe extending along and over the bench. In charging a chamber, a known quantity of breeze is first dropped from measuring hoppers on the bus on to the bottom chamber door, to protect it during carbonization of the charge, the coal charge is then dropped from the bus, the charging ports are covered up, and the chamber is brought into communication with the foul main.

Each chamber is provided with its own cast-iron gas offtake pipe, having liquor sprays for cooling the gas. Cleaning ports and covers are provided throughout, hinged where desirable, so that all pipes can be easily inspected and cleaned when necessary.

The gas in its travel from the chamber to the foul main passes through a cast-iron seal pot (one of which is provided per chamber) which is the connection between the gas offtake pipe from the chamber and the ascension pipe to the foul main (fig. VI.). During charging and discharging of the chamber a curtain plate dividing the offtake pipe from the ascension pipe is water sealed by the lowering of a lever on the charging floor which raises a sleeve in the overflow, and consequently the level of the liquor in the seal pot. A liquor connection to the seal pot enables rapid sealing of the curtain plate to be carried

out. When the chamber has been charged, the lever on the charging floor is raised, the level of the liquor in the seal pot falls, the curtain plate becomes unsealed, and connection between chamber and foul gas main is made.

The foul gas main extending along the top of the bench consists of a steel main 32 in. in diameter, provided with thirty 8-in. valves and cast-iron connections (ascension pipes) from the seal pots.

The tar deposited in the seal pots is removed by an 8-in. cast-iron main (running alongside the whole bench) to which connection from each seal pot is made.

The apparatus for supplying liquor to the sprays in the gas offtake pipes consists of an overhead 2000-gall. tank, situated in the bunker tower, provided with a level indicator on the ground floor and a steam driven liquor pump of 2000 gall. per hour capacity.

Steaming.

The chambers have equipment for steaming, so that during the later hours of the carbonization period water gas may be made. The patent system of introducing the steam is from an insulated manifold through the sole plate of the chamber, which has a steam channel surrounding the bottom of the chamber provided with outlets for the steam into the chamber. For every chamber a separate valve controls the supply of steam, while beyond the valve is a diaphragm with an aperture, governing the rate of steaming the chambers. The steam required for water gas manufacture in the chambers is raised in the waste-heat boilers of the producer plant and enters the steaming manifold through a pressure reducing valve.

The hot coke being discharged from the chamber falls directly into an electrically operated coke bus with distance control, which travels on rails extending under the chambers to the end of the bench, where the coke is quenched.

Operation of the Plant and Observations During Test.—Durham Coals (Run-of-Mine).

As stated above, the official test on the plant extended over four weeks. No special test conditions were imposed, and none but the ordinary every-day running conditions obtained. The results, therefore, may be regarded as those given on any normal working day.

The coal supplied to the plant during the test consisted of the following:

Boldon . . .	Unscreened gas coal . . .	Durham
Holmside . .	" "	"
Silksworth . .	" "	"
Thornley . .	" "	"
Wearmouth . .	" "	"

The coal was loaded from boats by grabs into barges which were pulled alongside the gas-works wharf, and from there the coal was delivered by grabs into hoppers, and thence *via* crushers, bucket conveyor, and elevator into the bench bunker. The coal, which was used as received without any blending, varied somewhat in size, but, generally speaking, contained a high proportion of dust with occasional large lumps.

Samples were taken from the stream of coal as it fell from the bunker into the hoppers of the coal bus every time that the bus was loaded—*i.e.*, prior to the charging of each chamber. These samples were collected in an air-tight bin kept at atmospheric temperature, the bulk sample being removed every 24 hours and passed through a Sturtevant crushing-sampling machine. The representative sample was then taken to the laboratory, ground to the requisite size, and analyzed by the Fuel Research Board standard method. The analysis of the average coal is given in Table I.

During the test the period of charging adopted was 14 hours. Steaming was carried out for 2½ hours at 60 lbs. per sq. in. pressure; the complete programme being as follows:

Carbonizing period	11½	hours
Steaming "	2½	"
Drying "	¼	hour
Total	14	hours

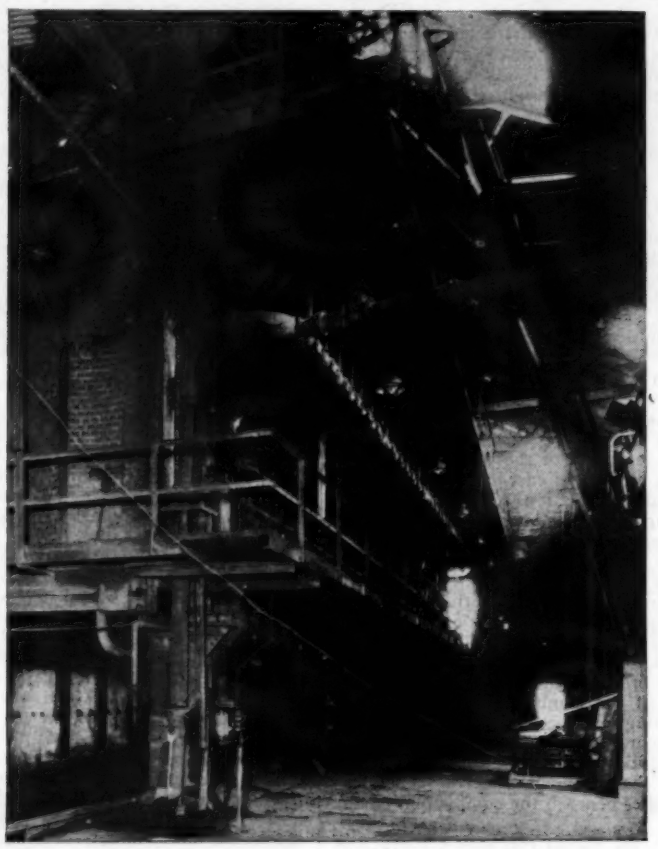


FIG. 1.

The calorific value of the oven gas aimed at during the test was 475 B.Th.U., but the average obtained over the month was 486·5 B.Th.U.; the percentage of steam over the period was 9·33 of the weight of coal carbonized.

Gas offtake pipes, as already stated, are provided for each chamber, and are continuously sprayed with ammoniacal liquor to cool the gas leaving the chambers.

The crude coal gas, after passing through the seal pot into the common foul gas main, was drawn under a vacuum of 2 to 3 tenths W.G. through atmospheric condensers and a "Connersville" meter, thence to scrubbers and purifiers. The conditions at the meter were recorded and corrected for.

Sampling and Testing the Gas.

Continuous dropping samples of the oven gas were taken in an aspirator from the gas main just after the "Connersville" meter, the gas being made to pass through a small oxide purifier. These samples were analyzed every 24 hours, the results obtained being shown in Table II.

The calorific value of the gas was tested every quarter of an hour in a Boys calorimeter, and continuously indicated by a Carr-Nairne jet calorimeter and recorded by a "Sigma" recording calorimeter.

OBSERVATIONS ON THE PLANT DURING TEST.

Coke to the Producers.—The coke supplied to the producers during the major part of the test was obtained from the oven plant, after grading. The size varied slightly, but was generally 1 to 1½ in. During the remainder of the test, coke was supplied from the horizontal plant as well. For the first ten days of the test, the coke was weighed on the works weighbridge before being elevated to the producer coke bunkers; and from the weights obtained, an average weight of coke per hopper was ascertained. For the remainder of the test, the results were based on this average figure. Samples were taken from the stream of coke as it passed from the bunkers to the feed hoppers every time that the producers were charged. The samples were collected in an air-tight bin kept at atmospheric temperature, and removed every 24 hours for sampling and analysis. On account of the high moisture content of the fuel, the fuel consumption was naturally higher than was expected; but from the figures obtained, this was calculated for coke having a 5 p.ct. moisture content.

Producer Gas.—The producer gas from the plant was measured by means of a Kent balanced manometer, the orifice plate being inserted in the 24-in. producer gas main running from the producer plant to the recuperator of the carbonizing plant. Continuous dropping samples of the cold clean gas were taken in an aspirator and analyzed every shift, the average analysis being shown in Table II.

Ash.—The ash from the grates of the producers was sampled regularly, and the weight estimated from an average weight of a barrow-full. The average analysis of the ash is given in Table III.

TABLE I.—*Coal Analysis.*

Proximate Analysis (as Charged). (Average of 28 Samples.)

	P.Ct.
Moisture	2·65
Volatile matter *less* moisture	31·38
"Fixed carbon"	58·04
Ash	7·93
	100·00
Volatile matter in ash-free dry coal	35·13

TABLE II.—*Analyses of Gases.*

	P.Ct.
Chamber oven gas—	
[Steam	9·33]
CO_2	3·2
C_nH_m	2·9
O_2	0·4
CO	12·4
H_2	48·6
CH_4	20·9
N_2	11·6
	100·0
Calorific value of above = 482 B.Th.U. (calculated).	
Observed calorific value, B.Th.U. per c.ft. at 60° Fahr. and 30 in. saturated	485·6
Specific gravity (approximately)	0·425

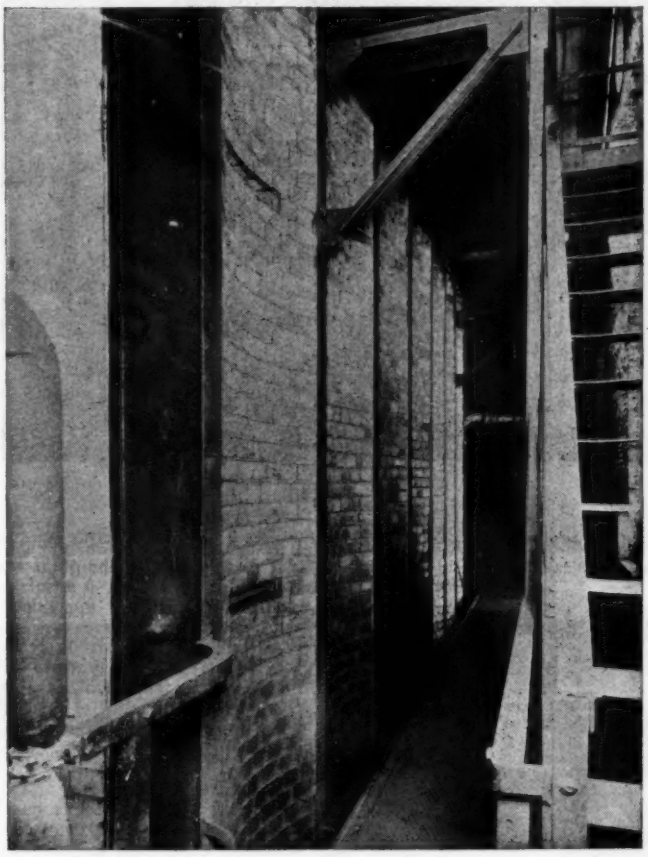


FIG. II.

	P.Ct.
Producer gas—	
CO_2	7·0
C_nH_m	..
O_2	..
CO	27·6
H_2	11·4
CH_4	0·6
N_2	53·4
	100·0
Calorific value, B.Th.U. per c.ft. at 0° C. and 760 mm.	132·9

	P.Ct.
Flue gas at inlet to chimney—	
CO_2	14·7
O_2	4·4
N_2	80·9
	100·0

TABLE III.—*Producer Ash Analysis.*

	P.Ct.		Dry Basis. P.Ct.
Moisture	23·00	..	..
Combustible matter	5·55	..	7·33
Ash	71·45	..	92·67
	100·00	..	100·00

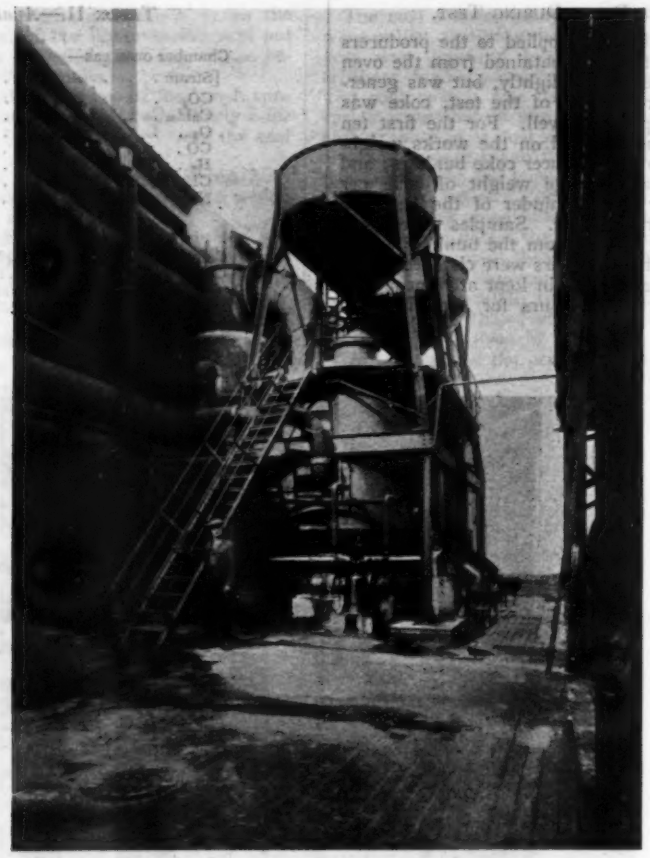


FIG. III.

TABLE IV.—*Main Details of Test.*

[Duration of test, 28 days.]

Coal—	
Total carbonized, tons	4,277·53
Number of chambers charged	1,405
Charged per chamber, tons	3·04
Moisture, p.ct. as charged	2·65
Breeze—	
Total weight charged, tons	503·27
Charged per chamber, cwt. (this weight was high because the excessive moisture of the breeze prevented efficient spreading)	8·04
Steam—	
Total to chambers, tons	398·8
Percentage by weight of coal	9·33
Gas—	
Total made, saturated at 60° Fahr. and 30 in., c.ft.	75,093,000
Yield per ton of coal, c.ft.	17,555
Calorific value, B.Th.U. per c.ft. (gross)	485·6
Yield per ton of coal as received, therms	85·25
Yield per chamber per day, therms	444·5
Specific gravity (air = 1) approx.	0·425
Coke to producer plant—	
Total weight gasified (5 p.ct. moisture, 12·5 p.ct. ash), tons	710·07
Fuel consumption, p.ct.	16·60
Fuel consumption (coke ash and moisture free), p.ct. (N.B.—Outside producers, 14-hour charges.)	13·6
Average fuel depth	6 ft. 6 in.
Average ash depth over grate	7 in.
Ash from producer plant, tons	131·30
Producer gas to oven setting—	
Total gas consumed, c.ft.	117,737,000
Calorific value, B.Th.U. per c.ft. net	132·9
Water evaporated in waste-heat boilers—	
Total weight evaporated, lbs.	2,469,350
Lbs. of steam raised per lb. of raw fuel (at 115 lbs. per sq. in. gauge)	1·55
Lbs. of steam raised per ton of coal carbonized (from and at 212° Fahr.), approx.	600
Coke made—	
Make of dry coke per ton of coal, cwt.	13·59
Fuel consumption, dry coke, cwt.	3·11
Dry coke for disposal per ton of coal, cwt.	10·48

Comparison of Guaranteed and Test Results.

[Chamber Oven Plant.]

—	Guaranteed on the Coal as Supplied	Test.	Decrease or Increase. P.Ct.
Capacity of chambers	3·00 tons	3·04 tons	+ 1·3
Gas make per ton of coal	16·885 c.ft.	17·555 c.ft.	+ 4·0
Calorific value	475 B.Th.U.	485·6 B.Th.U.	+ 2·2
Thermal yield per ton of coal	80·2	85·25	+ 6·5

Test of Yorkshire Coal.

A further test on the plant was carried out when carbonizing Yorkshire coal, and a brief description of the test and the results obtained are appended. The period of the test was Feb. 4 to 9, 1929.

A consignment of 1000 tons of Thorncliffe washed singles was delivered to the Wandsworth Works wharf in barges holding about 200 tons each. The coal was in a very wet condition, principally on account of the leaky state of the barges (18 in. of water was found at the bottom of one or two of the barges on unloading). The analysis of the coal samples, taken daily, will be found in Table I.A.

Ordinary Durham coal from store was being carbonized in the plant prior to the introduction of the Yorkshire test coal. Chambers were being charged at 14-hourly intervals, and the steaming conditions in force were such as to yield constantly gas having a calorific value of 470-480 B.Th.U. per c.ft.

For the special purpose of the test, it was decided to raise the calorific value to 500 B.Th.U., and to this end the steaming period was reduced.

The last chamber containing Durham coal was discharged at 4 a.m. on Tuesday (5th), and it became obvious that the results required would not be obtained with the existing temperature and steaming conditions; and it was decided to reduce the charging times and alter the steaming conditions accordingly. Consequently, after making certain tests to ascertain the best operating conditions, the charging time for the Yorkshire coal was fixed at 12 hours.

Features of the Yorkshire coal are shrinkage and cleavage of the coke. To avoid adverse results from this shrinkage, it was necessary to make sure that the stokers completely filled the chambers. Special methods were adopted to achieve this successfully; but until the stokers became used to the methods as modified for treating Yorkshire fuel, overcharging did take place from time to time, resulting in a certain amount of gas loss. It was noticed that the coke charges had come away from the walls to an extent of ¾ to 1 in. at the top, and a central line of cleavage along the major axis of the chambers was very pronounced, and indicated a porous charge—an ideal condition for efficient steam conversion.

With regard to the formation of scurf, the test period was not long enough to indicate any difference from Durham coals. The "free space" at the top of the charges, though larger with Yorkshire than with Durham coal, was offset by the fact that, on account of the shorter charging period, the average temperatures at the top of the chambers were lower than those experienced under normal working conditions for Durham coal.

In order to be sure of thoroughly reliable results, all the chambers had to be full of Yorkshire coal before the recording

of the test results was commenced; and this had to cease as soon as the Durham coal was recommenced.

Weighing of the coal was carried out over 48 hours, and from the figures obtained an average weight of "coal per charge" was obtained, which was employed during the remainder of the test period. The coal was sampled daily, samples being taken from the stream of coal as it fell from the bunkers into the bus hoppers. Daily constant dropping samples of the gas were taken at a point near the "Connersville" meter in such manner as to ensure continuous and regular average samples throughout, the gas being passed through a small oxide purifier before collecting in the aspirator. The results obtained are shown in Table II.A.

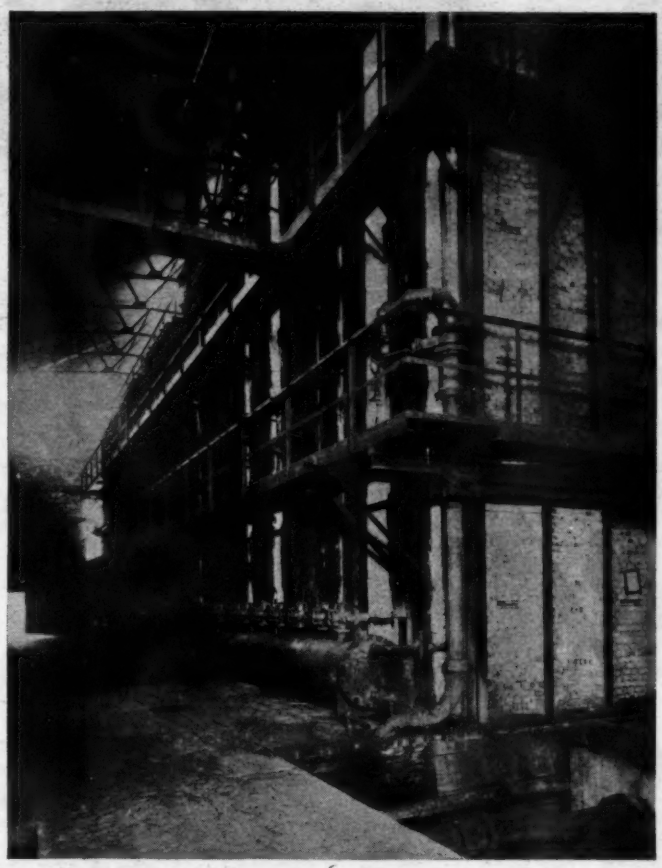


FIG. IV.

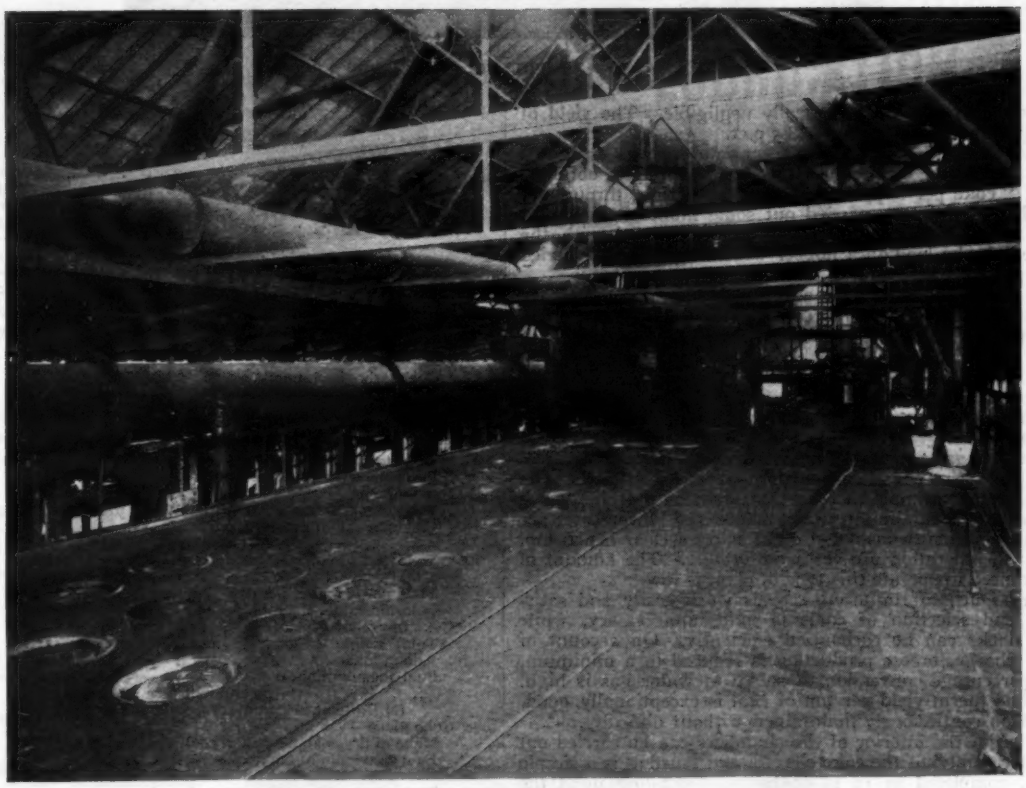


FIG. V.

The production of breeze from the Yorkshire coal was, as in

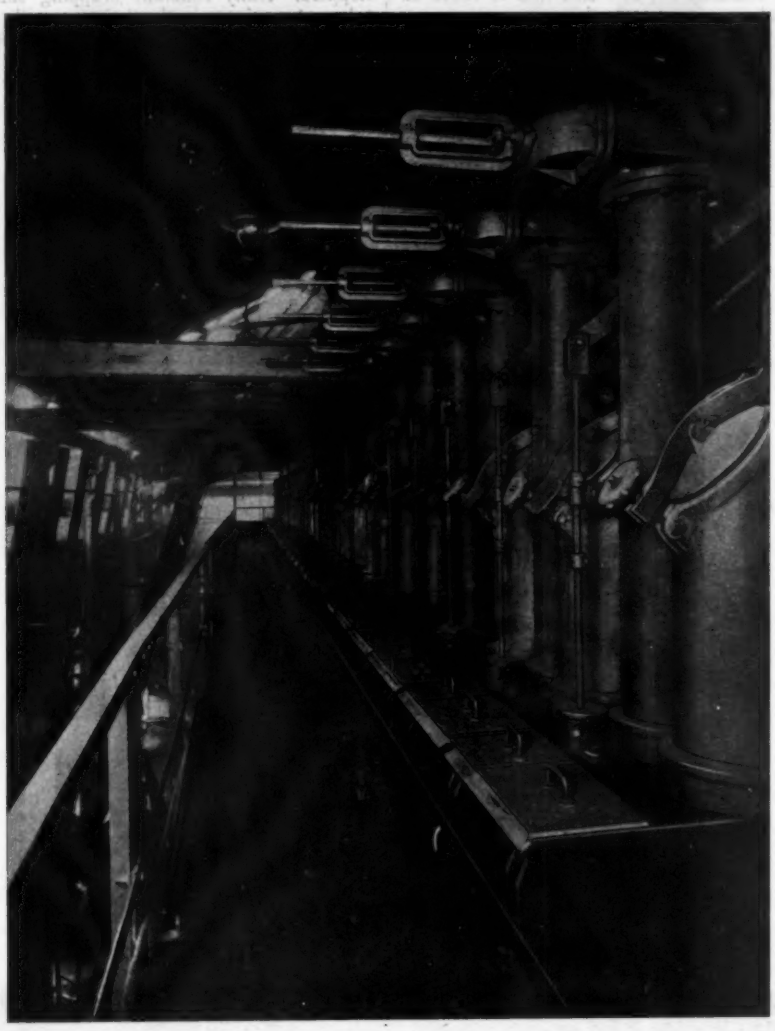


FIG. VI.

the case of Durham coal, practically negligible. The yield of dry coke per ton of dry coal was 68·5 p.ct.

The weight of coke supplied to the producers was estimated from the number of hoppers charged and a carefully obtained weight of "coke per hopper." This latter weight throughout the month's official test, carried out some months previously, was 6·44 cwt., and this was tested and confirmed with the Yorkshire coke by loading a hopper with weighed coke carried up to the producer platform.

It was decided to put aside about 200 tons of the coal for future use, so the test ceased at 6 a.m. on Saturday (9th), when normal working on Durham coal was reverted to.

General Remarks.

In conclusion, it may be of interest briefly to state some of the outstanding features of the plant which have contributed to its success.

The make of gas per unit of area is high—a point which will appeal to engineers whose carbonizing space is restricted. The plant is extremely simple in operation, and, as machinery has been reduced to a minimum, maintenance and power costs are low. Being efficiently insulated and having a clear bench top, conditions for operation are very comfortable. The amount of labour required to operate this type of plant is low.

Ordinary Durham run-of-mine coals work easily and satisfactorily, and selection of coals is quite unnecessary, while common slacks can be carbonized efficiently. On account of the static charge, breeze production is reduced to a minimum, and the percentage conversion of steam to water gas is high. The gaseous therm yield per ton of coal is exceptionally good, and has been continuously maintained without difficulty.

Inspection of the interior of the chambers can be carried out at will after emptying the coke charge, and scurfing is a simple operation, completed in 12 to 16 hours, depending upon the particular charging period in force at the time.

Outside mechanical producers, which were preferred in this case, yield very even quality gas, which can be easily regulated, and which is entirely dust-free. Hand clinkering is consequently dispensed with, and the amount of carbon in the mechanically discharged ash is very low. It should be remarked, however, that when deciding upon this plant the Gas Company had the choice between outside and self-contained producers, their preference having been on the side of the former.

That the plant has given satisfaction to the Company during more than a year's operation is evidenced by the fact that they have just ordered another and larger unit.

Table Ia.—*Coal Analysis.*

Proximate analysis (as charged).

	P.Ct.
Moisture	7·6
Volatile matter *less* moisture	34·1
"Fixed carbon"	53·0
Ash	5·3
	100·0
Volatile matter in ash-free dry coal	39·2

Table IIa.—*Main Details of Test.*

Duration of test, days	4
Coal—	
Coal carbonized, tons	618·9
Number of chambers charged	229
Charged per chamber, tons	2·7
Moisture, p.ct. as charged	7·6
Steam—	
Total to chambers, tons	46·6
Percentage by weight of coal	7·5
Gas—	
Total made, saturated at 60° Fahr. and 30 in., c.ft.	10,479,000
Yield per ton of raw coal, c.ft.	16,932
" " " " " therms	83·3
Yield per ton of coal (ash and moisture = 7 p.ct.), therms	88·9
Yield per chamber per day, therms	429·5
Calorific value, B.Th.U. per c.ft. (gross)	492·2
Coke to producer plant—	
Total weight gasified (5 p.ct. moisture, 12·5 p.ct. ash), tons	92·82
Fuel consumption, p.ct.	15·0
" " (ash and moisture free), p.ct.	12·4
(N.B.—Outside producers, 12-hour charges.)	
Coke made—	
Make of dry coke per ton of coal, cwt.	13·84
Fuel consumption, dry coke	2·85
Dry coke for disposal per ton of coal	10·99

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We can make your Stove Department show a big increase in profit.

BEST VALUE IN THE TRADE, AND CHEAPEST.

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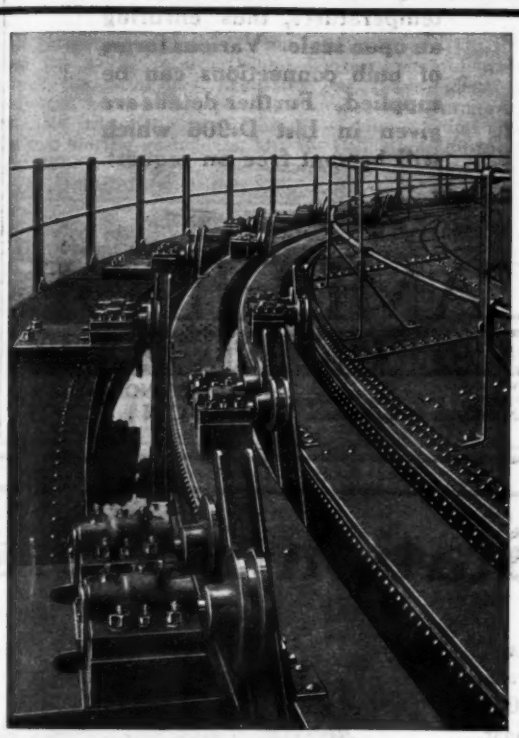

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PROVIDES
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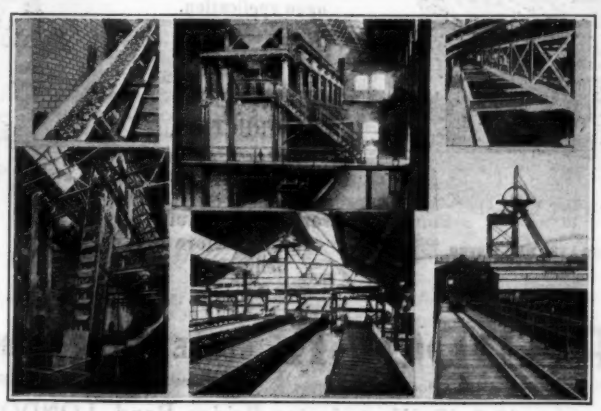

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RETORT SETTINGS, PRODUCERS, FURNACES REPAIRS.

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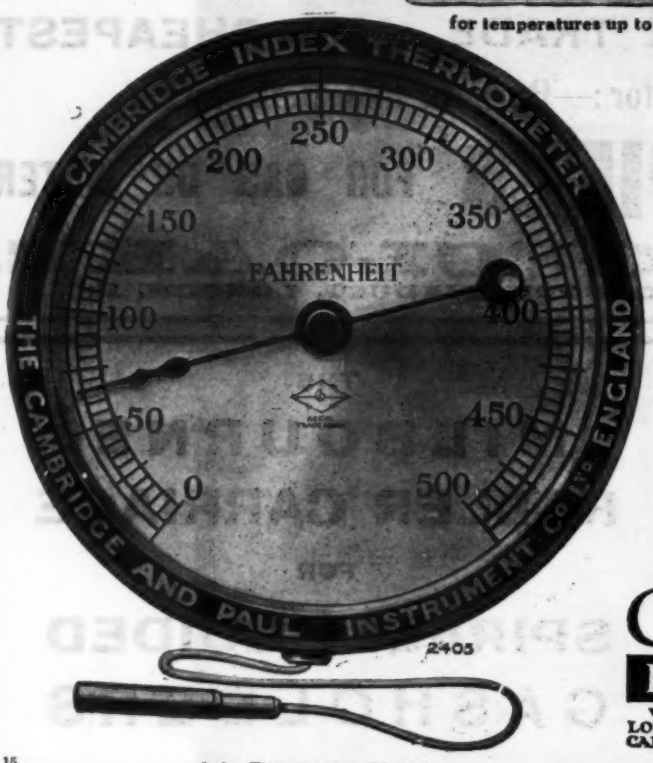

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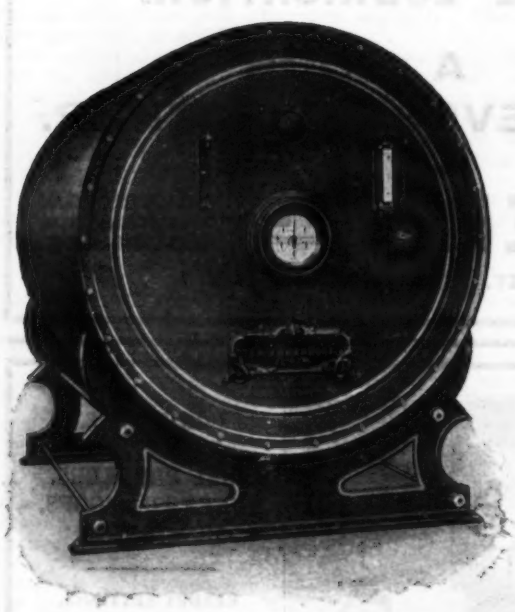

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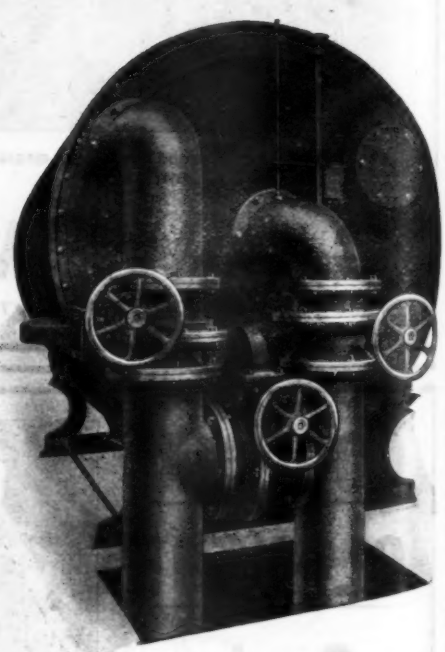

No. 10a.—BACK VIEW OF ROUND METER WITH SLIDE VALVES AND BY-PASS.

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NEW CONTINUOUS VERTICALS AT GORLESTON.

Inauguration of Woodall-Duckham Installation.

A further stage in the history of the Gorleston and Southtown Gas Company has been reached, with the adoption of the Woodall-Duckham system of carbonization in continuous vertical retorts. The new installation was inaugurated on Tuesday of last week.

HISTORY OF THE COMPANY.

The Company came into existence in 1855 under the name of the Gorleston and Southtown Gas Light and Coke Company, Ltd., and in 1876 the Company was dissolved, and reconstructed in the same year under Parliamentary powers. Further additional and extensive powers were granted by Parliament in 1903 and again in 1921. In July, 1928, the British Gas Light Company, Ltd., acquired control of the Company.

During the war the Company was one of the first to assist the Ministry of Munitions by installing plant for the recovery of toluol. The Company's property was hit and damaged during the first Zeppelin raid over this country on Jan. 19, 1915, and on the morning of April 25, 1916, suffered considerable further damage during the bombardment. On this occasion the works received about fourteen hits, of which two struck the gasholders, firing the gas. Fortunately, no lives were lost, nor were any persons injured. For courage and high example in assisting to right the serious position caused by the two blazing gasholders, Mr. W. Poll, the Company's Assistant Works Manager, was awarded by the King the Medal of the Order of the British Empire.

DESCRIPTION OF WORKS.

The works are conveniently situated on the west bank of the River Yare, and the whole of the coal received is seaborne. The old carbonizing plant is of the horizontal type; there being six beds of six retorts, each ⏢ shape, 21 in. by 15 in. by 10 ft. long. These are operated by a manual charging machine, and the house is equipped with all modern devices. The ancillary plant is of the usual type in works of this capacity.

The manufacture of coal gas can also be supplemented with water gas made in "K. & A." plant of a capacity of 250,000 c.ft. per day, with the customary ancillary plant.

The new carbonizing plant consists of an installation of Woodall-Duckham continuous vertical retorts having a gas-making capacity of 800,000 c.ft. per day when making gas of a calorific value of 480 B.Th.U. per c.ft. The retort bench is erected in a steel frame house, and is complete with waste-heat boiler, coal breaking and elevating plant, coke gantry, and water softening plant. The Contractors for the scheme were the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

The storage consists of three gasholders. One has a capacity of 200,000 c.ft., was erected in 1903, and is prepared for the addition of a further lift. Each of the other two has a capacity of 60,000 c.ft.

A Cutler sulphate of ammonia plant and a Hird-Chambers tar plant (capacity 3 tons per day) have been erected for the purpose of dealing with these bye-products.

DISTRIBUTION.

The distribution is by high and low pressure, the compressors being of the reciprocating type—the larger, by Bryan Donkin, having a capacity of 15,000 to 20,000 c.ft. against a pressure of 10 lbs. per sq. in., and the smaller, by Ingersoll-Rand, having a capacity of 10,000 c.ft. against a pressure of 100 lbs. The area of supply is 2523 acres, and the population in 1921 was 20,391. The number of consumers supplied by prepayment meter is 3539, and by ordinary meter 665. The mileage of mains is 21½.

WOODALL-DUCKHAM INSTALLATION.

The installation consists of one bench containing eight retorts heated by means of two producers placed at retort house floor level at one end of the bench. Coal is delivered by a portable inclined conveyor or barrows into a small coal receiving hopper arranged at yard level. From this hopper the coal is fed into a 15-ton per hour two-roll breaker by means of a jigging feeder. Arrangements are made for the small coal to by-pass the breaker, it being subsequently remixed with the broken coal. The coal is then fed through a chute into a 15-ton per hour bucket elevator which delivers it into overhead storage hoppers of 48 hours' capacity arranged above the retort bench. The design of the setting is in accordance with the latest practice of the Woodall-Duckham system, special features being as follows:

For heating the retorts two step-grate producers, each large enough to supply the gas for heating four retorts, are provided at the retort house floor level at one end of the retort bench. They are arranged so that one producer may be shut down without interfering in any way with the working of the other. The gas from either producer may be taken to the heating flues of any of the retorts.

For dealing with the coke required for the producers the skips are run into a steam engine driven lift and elevated to the producer charging platform. At this level they are run out of the lift on to cast-iron plates laid on top of the producer brickwork, and the coke is discharged direct into the charging holes.

For dealing with the surplus coke, skips are run into the lift and are elevated to the level of an outside gantry, along which the skips are taken and discharged either into open storage in the yard or into the screening plant. The screen is of the rotary type, and separates the coke into three sizes, which are stored in a series of separate compartments of the store.

The waste-heat boiler, which is of special design, is of the horizontal multitubular fire-tube type, suitable for a working pressure of 120 lbs. per sq. in. It is fitted with steam jet blowers of the Parry type, in order to keep the inside of the boiler tubes clean and free from dust.

The water required for use in the waste-heat boiler is softened in a plant of the Lassen-Hjort continuous automatic type having a capacity of 500 galls. per hour for 24 hours per day. The plant comprises a main reaction and filtration tank constructed of steel plates, a positive measuring apparatus, and a complete system of stirrers to ensure the reagents being maintained in a state of even admixture throughout the whole time the plant is working. The plant is so designed that each small measured quantity of water receives its correct dose of chemicals at the moment it is discharged into the reaction and settlement tank of the softener. The water, after softening, is filtered before it enters the waste-heat boiler.

INAUGURATION CEREMONY.

The formal opening of the plant was accompanied by an inspection, in which a number of guests took part. On arrival at the works, they were received by Mr. Henry Woodall, J.P., M.Inst.C.E. (the Chairman of the Company), who was accompanied by Mr. Harold G. Palmer (Deputy Chairman) and Mr. Andrew Kellard (Secretary). The various features of the new installation were explained by Mr. Edward F. Keable (Engineer and Manager), Mr. E. W. Bonsey (Distribution Engineer), and Messrs. W. Poll and A. Higham (Assistants). The ceremony of pulling a lever regulating the coal supply was performed by the Mayor (Councillor H. T. Greenacre, J.P.); and thereafter the party were conveyed to the new Winter Garden of the Pier Hotel, where they were entertained at luncheon by the Chairman and Directors of the Company. Mr. Henry Woodall presided; and, in addition to the gentlemen already named, those who sat down included Alderman A. Harbord, M.P., J.P., Mr. C. S. Orde, J.P. (late Chairman of the Company), Mr. S. P. Thompson, Assoc.M.Inst.C.E. (Borough Engineer and Gas Examiner), Alderman H. D. Arnott, J.P. (Deputy Chairman of the Great Yarmouth Corporation Electricity Committee), Mr. P. G. Campling (Borough Electrical Engineer), Mr. G. J. Jackson (Managing-Director, Woodall-Duckham Companies), Mr. P. D. Walmsley, B.Sc., (Great Yarmouth Gas Company), Mr. Thomas Glover, C.B.E., M.Inst.C.E., J.P. (Norwich), Mr. Harold E. Copp, M.Inst.C.E. (Hull), Mr. E. G. Smithard (King's Lynn), Messrs. P. Colyer and W. H. Price (Cromer), and Mr. C. R. Fowler (Leiston).

The CHAIRMAN, after lunch, expressed the gratitude of the Directors to the Mayor for coming and opening the new carbonizing installation. As a token of their appreciation, and as a small memento of the occasion, he asked Councillor Greenacre to accept a silver cup.

The MAYOR, acknowledging the presentation, said he understood that a replica of the handsome cup which had just been handed to him was presented by the British Gas Light Company to members of their staff who had completed 25 years of faithful service. It was, therefore, a peculiar honour to him to receive one. He recalled that his father bought shares in 1890 in the Gorleston and Southtown Gas Company, which came into existence 74 years ago. His father eventually became a Director of the Company, as he (the speaker) subsequently did. Through the war, the Company found themselves in a very difficult financial position, because, under their Act, they were precluded from raising the price of gas beyond a certain figure, though the cost of everything else soared heavenwards.

BRITISH GAS LIGHT COMPANY IN CONTROL.

However, they overcame all this, and once more got themselves into a favourable position, when the British Gas Light Company came along and made them an offer for their shares. The Gorleston Directors considered that it would be a great advantage to the shareholders to accept the fair and reasonable offer that was made to

them. They knew that a Company of such magnitude as the British Gas Light Company would be able to raise money on much better terms than a small undertaking like the Gorleston Company. The Gas Company were large ratepayers, and employed a great deal of labour, so that it was the duty of the Municipality to give every support that was possible without detriment to their own electricity undertaking. The plant which they were inauguraing that day had a gas-making capacity of 800,000 c.ft. per diem, while the present maximum demand was 320,000 c.ft., so that there was plenty of scope for further output. The work was commenced in September, 1928, and gas making was started at the beginning of the present month. The contract—and this did great credit to the Contractors—was completed dead on time. The plant was entirely British, and a considerable amount of local labour had been engaged upon it. Some 75 p.ct. of the consumers were cooking by gas, and the consumption was increasing yearly. Mr. Henry Woodall, their Chairman, like his father before him, had spent the whole of his life in the gas industry; and while the industry was directed by men of such calibre, it would continue to prosper.

Mr. HENRY WOODALL, in response, said that it was a great pleasure to Mr. Palmer and himself to meet those present, and to thank them for attending this ceremony. Both he and his colleagues regarded it as a compliment that so many important gentlemen of the district should be with them that day, and he thought it was specially a compliment to their Engineer and Manager, Mr. Keable, who had, he believed, won their respect and esteem. Before the British Gas Light Company took over the undertaking, Mr. Orde (whose presence there they much appreciated) and his colleagues had already a scheme in hand to modernize the works. Improvements had now been carried out, and those present had seen that day a most efficient plant. The Company expected to get excellent results from it. The cost had been heavy, but they had every reason to anticipate that the results would repay them. At all events, what had been seen that day would show them that the gas people were quite confident in the future of their industry. They were very glad to have with them Alderman Arnott (the Deputy Chairman of the Great Yarmouth Corporation Electricity Committee) and Mr. Campling (Borough Electrical Engineer); and he thought and hoped that they would agree there was room for both.

PURCHASING ELECTRICITY FROM THE LOCAL UNDERTAKING.

The Company were purchasing electricity from the Corporation, and not attempting to make it themselves. They could, of course, do so, possibly at a slightly lower cost then they were paying for it; but it had been the policy of his Companies to try to buy electrical power from the local undertakings, and they generally found them willing to meet them reasonably. The Company were most anxious to reduce the price of gas. They had already, since the taking-over, made two reductions, but the price was still high. A little time must be given to them; but as soon as the plant they had seen was fully occupied, reductions in price would take place. An increase in consumption was necessary before they could do much, but that increase was coming. They realized that the best advertisement for gas was a low price, and this was always before them. The Company had a most efficient works. The district was being well looked after; and he hoped the consumers were satisfied. Mr. Bonsey, their Distribution Engineer, was in his (the Chairman's) Office some twenty years ago, and he had always found him efficient and tactful and with a firm faith in the product he had to sell.

GOOD WORK AT GORLESTON.

He would like specially to thank Alderman Harbord (Member of Parliament for the Borough) for attending this function. Alderman Harbord would, he hoped, agree that this small Public Utility Company was doing its duty, and that gas was a useful public servant. A short time ago he (Mr. Woodall) met Mr. Baldwin, who was starting a new gas plant in the Potteries. Mr. Baldwin agreed that gas was a useful and necessary article, and that gas legislation was a model of what such legislation should be. He (the speaker) asked the local Member, who proposed Mr. Baldwin's health, to put in a word for gas, and told him he might say that if he were a betting man he would give odds that the then Prime Minister did not know that Whitehall—perhaps the best-lighted street in Europe—was lit by gas. This gentleman, who went down Whitehall daily to the House of Commons, replied "Good heavens! Is that so?" They would see, therefore, that gas did not get quite all the credit that was its due. All, however, he asked of those present was to bear witness that the Company were, in their small way, doing good work at Gorleston. They intended so to conduct their undertaking that no one in the district would have cause to complain of either the quality or the pressure of the gas—and before long no reasonable complaint as to price. He would not like to sit down without thanking the Port and Haven Commissioners for the work they had done for the Company, and also the Town Clerk for his kind assistance when they were erecting the plant.

The toast of "Our Guests" was given by Mr. H. G. PALMER, and was replied to by Alderman HARBORD, who congratulated the Company upon their foresight in providing Gorleston with such thoroughly up-to-date gas manufacturing plant. It had, he was told, already effected a marked improvement. He was glad to think they had still with them Mr. Keable, who had been known to them for so many years past as an exceedingly diligent and able official. By reason of public improvements, he believed there would be opportunities for building development which must ultimately benefit both the Corporation and the Gas Company, to whom he wished long-continued prosperity.

THE CONTRACTORS.

The CHAIRMAN, submitting the toast of "The Contractors"—the Woodall-Duckham Companies—remarked that the "Woodall" who originally, with Sir Arthur Duckham, designed this vertical retort, was a younger brother of the speaker's, and though no longer connected with the Company he was proud that his name should be associated with it. The work the visitors had seen reflected credit on those who designed and built it. Those of them who knew the progressive character of the firm and the honourable name they bore for good work had seen that day what they would have expected to see — a thoroughly sound job. He felt sure that neighbours would be glad to have the new plant working, and would appreciate the absence of dust and smoke almost unavoidable with the old plant. The Company would now use a clean, hard Yorkshire coal; and the complaints sometimes made by the fishing industry on the opposite side of the river, when the Company unloaded the more dusty Durham coal, would, he felt sure, be no longer necessary.

Mr. G. J. JACKSON, in reply, said that, if his firm had been able to get the job completed on time, it had only been by the kind and willing help of Mr. Keable, the Town Clerk, and the Port and Haven Commissioners. The plant embodied all the firm's latest improvements, and would give very satisfactory results. They had been successful in getting orders for similar plants for Valparaiso, in face of keen German competition, and for Quebec, in face of still keener American competition. The Valparaiso plant had already been tested, and all guarantees had been exceeded by 10 p.ct. The British Gas Light Company was known throughout the gas industry as a most efficient concern. The Directors were highly qualified, and the officials were of the best. Thus the consumers could always be sure of getting good service.

The cordial drinking of the Chairman's health, at the call of Mr. THOMAS GLOVER, brought the proceedings to a close.

"HI-LIFT" AND "LO-LIFT" SHOVELS.

The Improved "K" Type.

Up to three years ago, the only type of mechanical shovel built in this country was the excavator, which, while being an excellent tool for its purpose, was often considered too heavy, as well as being too costly, to use solely as a loader of loose material.

The Chaseside Engineering Company, of Enfield, London, believed then—and subsequent results have borne out their contention—that there was a wide market for a light type of mechanical shovel built not for excavation work, but for loading purposes only, which would be comparatively inexpensive to buy, cheap to operate and maintain, and so simple to work that any inexperienced man could be safely left in charge after a very short period of tuition.

As a consequence, the firm designed and placed on the market the Chaseside mobile loading shovel, made in two models, the "Hi-Lift," which will tip its load at any height up to a maximum of 9 ft., and the "Lo-Lift," which tips at a maximum height of 3 ft. 6 in.

These shovels will load into lorries or railway wagons, or feed hoppers, at a rate of from 20 to 35 tons an hour dependent upon the weight per cubic yard of the material lifted and the distance from the heap to where each load has to be tipped. Materials such as coke, coal, oxides, broken stone, loose earth, shale, sand, gravel, tarmacadam, phosphate, rock, superphosphates, and pyrites ash are being handled speedily and economically by Chaseside shovels. The shovels are driven by an internal combustion engine using petrol or paraffin as fuel, and an ample reserve of power is available for all purposes.

Being on solid rubber tyred wheels, the Chaseside shovel is extremely mobile and is easily manœuvrable in confined spaces. The scoop is of ½-yard capacity, and the shovel is operated by one man. The total running and maintenance costs, using petrol at its present price, are not more than 3s. 5½d. per hour. This figure includes fuel, oil, driver's wages, repairs, depreciation, and capital interest.

In spite of the large amount of spade work involved in marketing a new idea of this nature, over a hundred "B" type Chaseside shovels, both "Hi-Lift" and "Lo-Lift," had been put into use throughout Great Britain when the firm decided to discontinue this type and build a new and vastly improved shovel which they have designated the "K" type. This "K" type shovel represents the results of the whole of their experience on loading problems of practically every kind throughout the country.

Over thirty new features and improvements have been incorporated in the new shovel, and in addition the whole structure has been made very much more robust, and capable of standing up to the hardest kind of work. The firm, we understand, have not increased the price of the new "K" shovel, as they are confident that a much greater sales output will recompense them for the considerably higher production cost; and already their hopes are being realized in this direction. There is no doubt that the Chaseside loading shovel—a demonstration of which, by the way, was noted in the "JOURNAL" for Nov. 14, 1928—does provide a cheap and speedy means of handling any kind of loose material.

OPENING OF NEW GASHOLDER AT MILTON REGIS.

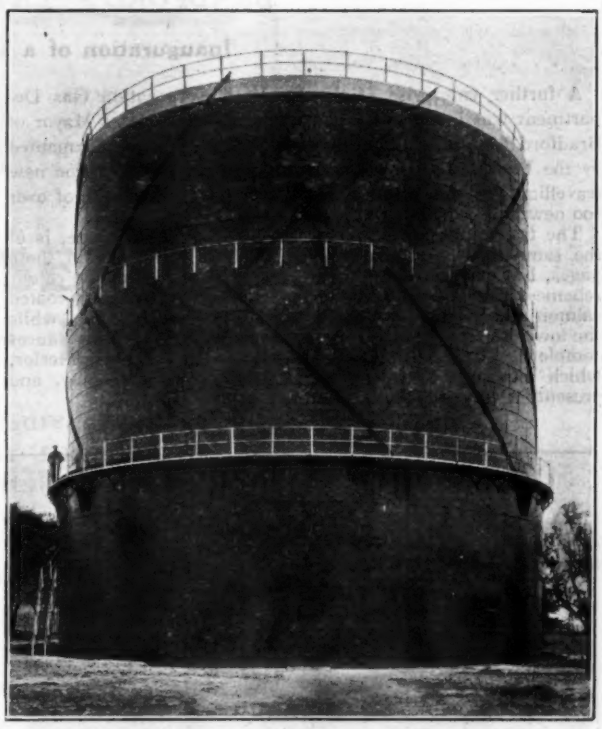
Erected by Messrs. Samuel Cutler & Sons, Ltd.

On July 10, Mrs. S. E. Maundrell, J.P., the Chairman of the Milton Regis Council, formally opened a new gasholder at the Gas-Works. This holder, which has a capacity of 200,000 c.ft., was erected by Messrs. Samuel Cutler & Sons, Ltd. It is of very substantial construction, no sheets being less than 10 gauge in thickness; and it exerts a minimum delivering pressure of 5 in. The guide carriages are throughout of Cutler's patent design, constructed entirely of steel, and fitted with the serrated locking adjustments which are such a useful feature of these carriages. The ladders on the sides of the lifts are provided with Cutler's patent safety grip treads, which provide an unusually secure foothold.

Councillor A. COLTHUP, Chairman of the Gas Committee, who presided, said that the gasholder was one of which he thought they had every reason to be proud; it could only be taken as a sign of progress. For some time past their amount of storage capacity had been very small, and in the event of any serious breakdown, he was afraid they would have been left without an adequate supply. The new holder had been erected by Messrs. Samuel Cutler & Sons, who had a world-wide reputation for this class of work; and the firm had carried out the task to the satisfaction of their Gas Manager, Mr. Heeley. The foundations were put down by Messrs. E. Bishop & Sons, and they were indebted to Messrs. F. Littlewood & Sons for the special castings to connect the mains, the connections being carried out by their own workmen. Mr. Colthup said he was pleased to be able to state that their gas undertaking for some considerable time had been showing good increases in output, and they hoped these increases would be maintained, even allowing for the introduction of electricity in their midst, particularly if they kept their works in an up-to-date state and studied service rather than profits. This, he was sure, was the aim of their present Gas Manager, who had brought the works up to a state that would compare favourably with any works of a similar size.

Mr. G. C. D. PHILLIPS, representing Messrs. Cutler & Sons, proposed a vote of thanks to Mrs. Maundrell for inaugurating the holder, and expressed the obligations of his firm to Mr. Heeley for the invariable courtesy and co-operation that had been extended to them during the carrying-out of the contract.

Councillor P. J. JEFFERY, Vice-Chairman of the Council, seconded the vote of thanks; and Mrs. MAUNDRELL, in reply, remarked that she was sure that, under the management of their Gas Engineer, the works would prosper.



The New 200,000 C.Ft. Holder by Messrs. Samuel Cutler & Sons.

THE "NEW WORLD" COOKER.

By F. BRINSLEY, M.Sc., of Radiation, Ltd.

From a Lecture before the Fitting Staff of the Bristol Gas Company.

Important improvements have been effected during the last few years in the design of gas cookers. Both hotplate and oven have been the subject of scientific and technical research, from which have resulted such fundamental changes that only in external outline does the "New World" cooker resemble its predecessors.

Dealing first with the hotplate, it may be stated that the objects in view have been threefold:

(1) Simplification accompanied by reduction of the wearing parts to the minimum number.

(2) Improvement in thermal efficiency, and the attainment of a higher standard of combustion.

(3) The provision of a hotplate of greater utility.

The various sizes of cookers in any particular series now differ in only one dimension—viz., the width. This has enabled the number of boiling burners to be reduced to two only—a long and a short shank—except in the case of those hotplates with which duplex burners are supplied. Hotplate bars are now either "units" or of two types only, as in the case of the "Disc Bar" hotplate. Bridges are the same throughout any one series. Such a process of reduction in the number of parts is not only advantageous to the manufacturer, but is a boon to gas undertakings, to whom the problem of stocking parts for renewal has for some time past been a matter of prime importance.

The thermal efficiency of the hotplate burners of the modern cooker has been largely increased as compared with that attainable with earlier types, and the problem of combustion

has been resolutely faced. This latter problem has necessitated the elaboration of a special chemical test for the determination of traces of carbon monoxide, and the application of standards of combustion which should be attained by all gas appliances, including cooker hotplate burners.

As regards utility, it has been the consistent aim of Radiation, Ltd., to combine the desirable features of high thermal efficiency, complete combustion, and pan stability on the hotplate. The "Disc Bar" is regarded as offering the best combination of these necessary qualities. Support is provided immediately over the burner head for even the smallest utensil; pans can readily be moved about on the hotplate without danger of tipping; and both high thermal efficiency and proper combustion of the gas are attainable. Correct regulation of the gas and primary air supplies to hotplate burners is a matter of some importance. Accordingly, every cooker is accompanied by a card of instructions containing full details as to the correct adjustment of the burners. The "Disc Bar" hotplate of the "New World" cooker possesses one unique feature. By provision in the "Vertico" tap-fitting of regulators for both calorific value and pressure, the necessity for air sleeves with the burners disappears. The burners on this hotplate can, therefore, be taken out and replaced without any fear that the correct adjustment will be upset.

Considering the oven, the removal of the flue from the top to the bottom has resulted not only in increased thermal efficiency, but in improved cooking conditions within the oven. The single burner and direct bottom-flue outlet construction paved the way to automatic oven-heat control by means of the "Regulo." The provision of the low-temperature zone at the bottom of the oven has added a new and useful feature without any sacrifice of the amount of high-temperature cooking which can be carried out at the same time. The simultaneous cooking of foods requiring widely different temperatures has made possible the planning of whole dinner menus comprising dishes which can all be placed in the oven at one time, cooked under "Regulo" control without the necessity for attention, and all withdrawn together perfectly cooked. The saving in trouble and the certainty of the process when carried out under "Regulo" control have done much to transform cooking from a laborious and uncertain, to an easy and sure, operation. Automatic oven-heat control by the "Regulo" has, since its first introduction more than six years ago, steadily increased in favour, proving that the busy housewife appreciates the efforts of the gas industry on her behalf.

Mr. S. E. Halliwell, the Secretary and Commercial Manager of the Bristol Gas Company, was able to be present; and at the end of the meeting a cordial vote of thanks was accorded to the lecturer, on the proposition of Mr. Conway.

BRADFORD'S LATEST ENTERPRISE.

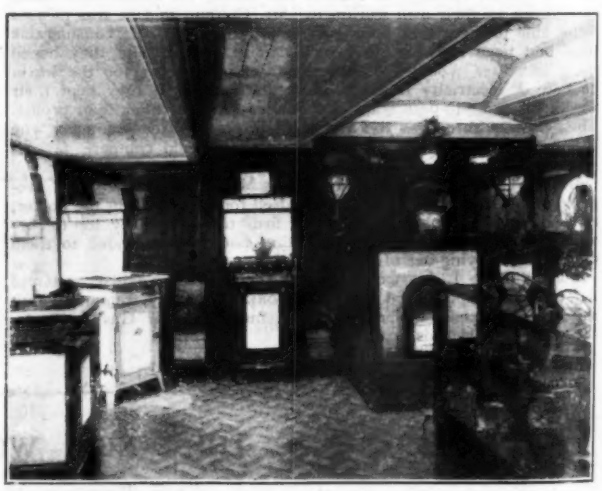
Inauguration of a Travelling Showroom.

A further enterprise of the Bradford Corporation Gas Department was inaugurated on July 1, when the Lord Mayor of Bradford (Alderman H. Thornton Pullan, J.P.), accompanied by the Lady Mayoress (Miss Dorothy Horne), opened the new travelling gas showroom at Eccleshill, where an estate of over 800 new houses has just been completed.

The travelling showroom, as the photographs indicate, is of the same type as others which have been illustrated in these pages, but extra attention has been given to the outside colour scheme of the structure, the upper two-thirds of which is coated salmon pink enamel suitably relieved with gold lettering, while the lower third is crimson lake; a black roof and black valances completing the scheme of decoration. The whole interior, which measures 21 ft. square, is finished in mahogany, and presents a very pleasing appearance to the visitor.

the Gas Committee, through the operation of the travelling showroom, hoped to be able to demonstrate their appliances on the door steps of their consumers. The Department realized that the most convincing way was by demonstration, and the residents of the district could come into the showroom and see for themselves exactly what gas could do. The Department was out to revive home-made bread baking, and this was where the gas cooker was pre-eminent, all large restaurants and caterers using gas.

The LORD MAYOR said that as the former Chairman of the Health Committee, he was responsible for the Corporation's 6000 houses, and the Committee in erecting these houses had endeavoured to ensure that there should be as little smoke emission as possible. Smoke emitted from domestic chimneys was almost as bad as smoke emitted from factory chimneys, and so far as that particular housing scheme was concerned,



Inside the showroom, gas appliances of all kinds are fixed and in actual use. The "New World" cooker—which was being used at the opening by a lady demonstrator who supplied visitors with cakes which had just been baked—"Mainamel," "Hygienic," and "Royal" cookers; various types of gas fire, two in use fitted into surrounds; "Califont" and "Hotpoint" geysers and "Hygienic" instantaneous water heater; ventilating and bowl lights, shades and globes, poker lighter, curling iron heater and washing coppers being numbered among the exhibits.

Alderman GEORGE WALKER (the Chairman of the Gas Committee), accompanied by Mrs. Walker, presided at the opening ceremony, and was supported by Councillor F. J. Cowie, Deputy Chairman, members of the Gas Committee, Mr. E. J. Sutcliffe, Engineer and Manager, Mr. E. Crowther, Deputy Engineer and Manager, Mr. S. H. Packer, Showrooms Manager, and Mr. J. W. Horwill, Commercial Assistant.

Alderman WALKER, in introducing the Lord Mayor, said that gas fires and gas heated washing coppers were supplied to every house, and now the Gas Department had brought that very fine display of gas cookers right into the heart of the district, so that consumers could come and select the one best suited to their requirements. The more gas used the less smoke there would be, and it was this problem which the Department was tackling.

The Lord Mayor then declared the showroom open, and after the Committee's inspection, a continual stream of visitors passed through.

Councillor BATESON proposed, and Councillor WATKIN seconded, a vote of thanks to the Lord Mayor for the interest which he had displayed.

Over 700 people visited the showroom during the first week, and many orders have been placed. A systematic canvass and maintenance inspection is proceeding throughout the whole district while the travelling showroom is located on its present site.

Why the CONSERVOR Oven is preferred for Home Baking

Its *two* burners ensure even heating all over the oven space, thus its capacity is not curtailed by varying temperatures from bottom to top.

It can be *fully* loaded, and will bake and brown perfectly on *every* shelf, and without changing the position of the loaves.

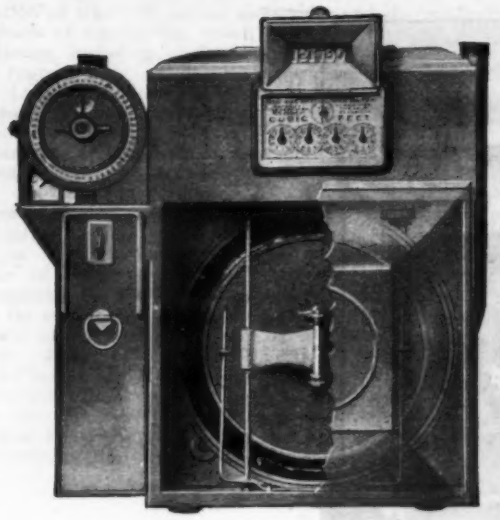
The

CONSERVOR

OVEN

There is no possibility of smothering with the new patented CONSERVOR Oven. It has a "factor of safety" of about 300%. Even with the flue outlet completely closed up it has a "factor of safety" of 100%.

N.B.—The Gas Oven Tests of the Institution of Gas Engineers are satisfied by a "factor of safety" of 60%.



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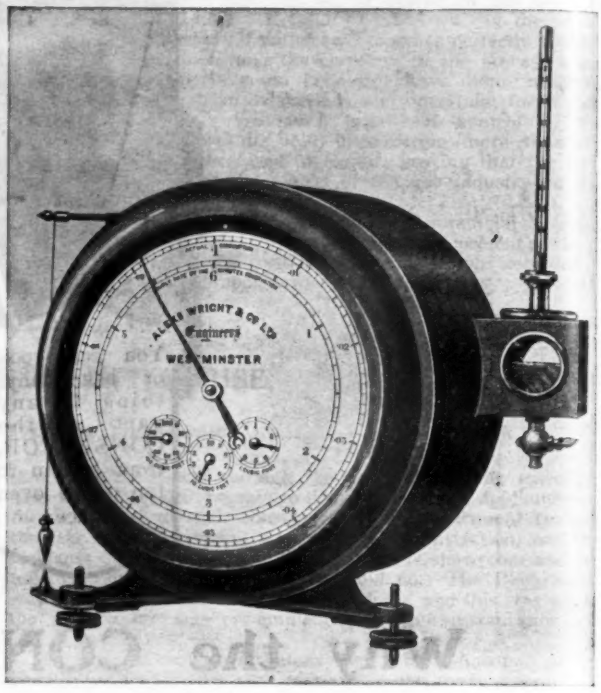

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REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 24.]

Nos. 21,661—22,394.

DAMIEN, E.—"Gas fires." No. 22,290.

EVANS, W. E. (SCHWEISS-UNTERNEHMUNG WEGNER ET CIE. KOMMANDIT GES.).—"Repairing damaged plates in gasholders." No. 21,999.

GALUSHA, A. L.—"Gates for gas producers." No. 22,379.

GOLDSPINK, G. E.—"Prepayment mechanism for gas meters." No. 22,036.

HURLEY, T. F.—"Gas producers." No. 22,218.

KIRKEWHITE ENGINEERING COMPANY, LTD.—See Goldspink, G. E. No. 22,036.

LANDER, C. H.—See Hurley, T. F. No. 22,218.

OTTO & CO., GES., DR. C.—"Coke ovens." No. 21,760.

PEEBLES, W. C. (PEEBLES & CO., LTD.).—"Gas governors." No. 21,946.

SIMPSON, J. F.—See Peebles, W. C. No. 21,946.

SOC. GAZ ET CHALEUR.—See Damien, E. No. 22,290.

PARLIAMENTARY INTELLIGENCE.

[From Our Special Correspondents.]

HOUSE OF LORDS.

The Royal Assent was given on July 26 to the following Bills: Romford Gas Bill; Inverness Water and Gas Order Confirmation Bill.

The following Special Orders were approved by the House of Lords on July 25, on the Report of the Special Orders Committee: Andover Gas Order, Weymouth Gas Order, Wateringbury Gas Order, Cleveland Gas Order, Stockport Gas Order. The Boston Gas Order and the Dudley Gas Order were approved with a modification. The Alton Gas Order was also approved.

The East Hull Gas Order and the Horsham Gas Order were laid before the House and referred to the Special Orders Committee.

HOUSE OF COMMONS.

The following Special Orders were approved on July 24: Alton and District Gas Company; Andover Lighting and Power Company; Boston Gas Light and Coke Company (with the omission of the words "and the non-dividend bearing capital created by Section 15 of this Order" in Clause 12—Sub-clause 3); Dudley Gas Light Company (with the substitution of "or" for "and" in Clause 50—Proviso "A"); Wateringbury Gas Company; Weymouth Consumers' Gas Company; and Cleveland Gas Company, subject to modifications.

The Special Order of the Stockport Corporation was also approved, subject to modifications.

Copies of the following Special Orders have been laid upon the Table: East Hull Gas Company; Horsham Gas Company.

LEGAL INTELLIGENCE.

SOUTHERN GAS COMPANY, LTD.

Mr. Justice MAUGHAM, in the Chancery Division, on July 23, granted an application in the action of Grimes *v.* the Southern Gas Company, Ltd., for the appointment of a Receiver and Manager of the Company, with liberty to act at once.

It was stated by Counsel for the applicant that the interest on the debentures had been in arrears since June of last year, and the security was in jeopardy owing to the fact that a creditor had obtained judgment against the Company, and was proceeding to levy execution. The Company, who were legally represented, assented to the appointment.

Bristol Pensioners Gathering.

The annual re-union of pensioners of the Bristol Gas Company and the presentation of certificates took place on Wednesday, July 24, in the Board Room of the Company's Head Offices, Colston Street. The pensioners were entertained at tea by the Directors. Lady Davies, wife of the Chairman of the Directors, Sir George E. Davies, presented long service certificates to those employees who during the year had joined the pensioners' ranks. After tea the Chairman of the Company presided, and, in welcoming the pensioners, said that the re-union gatherings were started three years ago. Though they had a number of pensioners, the Directors had very few opportunities of meeting them personally, and it was thought that the annual re-union and presentation of certificates would give them a good chance of doing so. He mentioned that in September, 1927, the employees of the Company who received long service certificates numbered 45, and in July last year eleven more certificates were presented. This year five more veteran employees were to receive certificates—viz., George Horne (41 years' service), Charles Chilton (23), Thomas Linch (18½), James Fletcher (49), and Thomas Haskins (19½).

MISCELLANEOUS NEWS.

GAS UNDERTAKINGS ACT ORDERS.

SECTION 6.

Alva Corporation.

The Corporation shall, from Feb. 1, 1930, charge according to the number of British thermal units supplied, and shall on or before Nov. 1, 1929, give notice of the calorific value of the gas which they intend to supply.

Fraserburgh Town Council.

The Council shall, from Nov. 12, 1929, charge according to the number of British thermal units supplied, and shall on or before Aug. 12 give notice of the calorific value of the gas which they intend to supply.

Kilmarnock Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of British thermal units supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas which they intend to supply.

SULPHATE OF AMMONIA PRICES.

Nitram, Ltd., in the course of a circular recently issued, say:

We give you below the prices at which we are prepared until further notice to book orders for sulphate of ammonia for home agricultural use during the present season. In fixing these prices, the 1s. per ton rebate on railway carriage which was allowed during a part of last season, to give buyers the benefit of the De-Rating Act, has been taken into account, so that in future no rebate or allowance of this nature will be made. We reserve the right to raise our prices at any time by sending out a printed notice to that effect. Any such increase in price will apply to all orders received after the date of issue of the notice. There will be no allowance for taking delivery *ex* works. As practically no ordinary quality is likely to be available, we refrain from quoting a price for this quality. It is understood that quantities purchased at the price stated below will be used for home agricultural purposes only. We offer to sell sulphate of ammonia for home agricultural use at the following prices for delivery in August, £9 9s., September, £9 9s. per ton for neutral quality guaranteed to contain 20·60 p.ct. of nitrogen by weight, and not to contain more than 0·025 p.ct. of free acid (H_2SO_4), and to be in readily friable condition at the time of delivery, delivered to consumer's nearest station or wharf in Great Britain (or c.i.f. main ports for the Isle of Man) for prompt cash payment in lots of 6 tons and upwards, packed in single bags containing about 2 cwt. net to be supplied free by sellers, tare allowed. When credit is given a reasonable extra charge may be made, but the discount allowed for prompt payment should be quoted on the invoice. The above prices will also apply to deliveries of 1 ton and upwards *ex* works or *ex* store to buyers' road vehicle.

A statement of conditions follows.

CHESTERFIELD GAS UNDERTAKING.

Important Re-Organization Scheme.

The Chesterfield Municipal Gas Committee have prepared a report and submitted it to the Town Council dealing with the re-organization and the co-ordination of the fitting and gas service departments. The objects of the scheme, the report states, are (1) to make a complete inspection of consumers' installations to ensure as far as possible that each appliance has an adequate supply of gas, is suitable for its purpose, and efficient in operation; (2) to extend the use of gas by the introduction of new business; (3) to seek and remedy complaints and to secure the goodwill and satisfaction of the consumers, thereby to some extent forestalling competition; and (4) to compile a full census of all appliances in use.

The scheme, it is contended, can be applied to the existing distribution organization as an auxiliary with very beneficial results. The examiners required will be selected from the existing fitting staff, and they will be given suitable training, their positions being filled by new fitters. The clerical work involved will be carried out by two female clerks—one who is at present employed at the gas showrooms, and the other to be appointed in the place of the present male clerk employed on complaints, &c., at the gas-works.

The services of canvassers previously provided by makers of gas appliances are not now available, but in lieu of this an extra 5 p.ct. discount off cookers, fires, &c., is being given which, with other extra income derived under the scheme, will practically cover the cost of working.

The Committee state that they are of the opinion that most beneficial results will accrue to the underaking by the adoption of the scheme, especially in view of the proposal that the examiners shall also canvass, and they express the hope that the scheme will be put into operation without delay.

Lea Bridge District Gas Company.—The Board of Directors have declared a dividend on the consolidated ordinary stock for the half-year ended June 30 last at the rate of 8½ p.ct. per annum (less income-tax) payable on Monday, Sept. 2 next.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

With better tonnage supplies, the tone of the market has shown a tendency to harden again during the past week. There is no question about the demand being good, and, on the whole, July has been a satisfactory month. In the natural course of events seasonal considerations should now begin to improve matters still further, and considerable quantities of coal have been sold which should form a good basis for operations over the remaining months of the year. It is most unfortunate that at this stage, when prospects appear more satisfactory than for many years, politics are once again entering into the picture. The uncertainty with regard to the hours question, and the possibility of an unwanted selling agency scheme being forced upon the district, are factors which are at present making forward business practically impossible.

Superior gas coals are again in good demand, and current quotations are 17s. 6d. f.o.b. for Wear Specials, and 16s. 9d. for best qualities. Seconds are steady at 15s. 6d. to 15s. 9d. Durham coking sorts are well booked at 16s. 6d. to 16s. 9d. Best bunkers are strong at 17s. to 17s. 3d., with good brands at 16s. 3d. to 16s. 6d., and others 15s. 6d. to 15s. 9d. Best Northumberland screened steams are 15s. 6d.

Gas coke is still quiet, with little prompt demand, but the market for forward is good, and the shipment price is maintained at 21s. 6d. to 22s. f.o.b.

YORKSHIRE AND LANCASHIRE.

Forward business on export account is still unsettled. Owing to the higher prices at the collieries and the uncertain outlook, there is a disinclination to enter into extended arrangements. There is a better demand for large steams, and quotations of 18s. to 18s. 6d. per ton are maintained. There is little change in the industrial fuel trade except for nuts and smalls, which are in slightly stronger demand. Coking coals are in good demand in view of the approaching holidays. Quotations for furnace coke remain firm at 21s. to 22s. per ton f.o.b.

The following are the Humber bunker and export prices (f.o.b. usual shipping ports):

South Yorkshire.—Hards, Association, bunkers 18s. 9d. to 19s. 3d., export 18s. to 18s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 18s. to 18s. 6d.; washed doubles, bunkers 18s. 9d., export 17s. 6d.; washed singles, export 16s. 6d.; washed smalls, bunkers 16s. 3d., export 15s. 6d.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 12s. 6d. to 13s.; smithy peas, export 19s. to 19s. 6d.

West Yorkshire.—Hartleys (f.o.b. Goole), bunkers 17s. 6d., export 17s. to 17s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 17s. 6d. to 18s.; washed doubles, export 16s. 9d.; washed singles, export 16s.; washed smalls, bunkers 15s. 3d., export 14s. 6d.; unwashed trebles, export 17s. to 17s. 6d.; unwashed doubles, export 15s. 6d.; rough slack, bunkers 13s. 6d., export 11s. 6d.; coking smalls, export 12s.

Derbyshire and Nottinghamshire.—Top hards, bunkers 18s. 9d. to 19s. 3d., export 17s. 6d. to 18s. 3d.; cobbles, bunkers 18s. 9d., export 16s. 6d. to 17s. 6d.; washed trebles, export 17s. to 17s. 6d.; washed doubles, export 16s. 6d. to 16s. 9d.; washed singles, export 16s. to 16s. 6d.; washed smalls, bunkers 16s., export 14s. 6d.; unwashed doubles, export 16s. to 16s. 6d.; rough slack, bunkers 14s. 3d. to 14s. 9d., export 12s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 16s. 6d. to 17s.; gas coke, export 21s. to 23s.; furnace coke, export 21s. 6d. to 22s. 6d.; washed steam (Goole, West Yorkshire), bunkers 17s. 9d.; (Hull, West Yorkshire), bunkers 18s. 6d.; (Hull, South Yorkshire), bunkers 18s. 3d., export 17s. 6d.

MIDLANDS.

Collieries are adjusting supply to demand, but it means cutting down the working week by something like half. There are incipient signs of growing activity in the best house coal trade. Stocking is proceeding very leisurely, however. Some collieries which produce coal specially suitable for stocking are putting up their prices by 6d. or 1s., more by way of testing the market than with any idea that strength has developed during recent weeks. Would-be buyers are reminded that they had due notice not to expect the minimum summer rates to be carried forward into August. Medium and low grades are plentiful, and collieries are only too glad to relieve the stocks which have accumulated at the pithead.

Slacks can be bought at 5s. 6d., but good nutty samples command almost double that amount. D.S. nuts are obtainable in plenty at late rates. Bakers' nuts, such as are produced largely in Warwickshire, are moving off fairly steadily. Prices range from 15s. up to 22s.

The scarcity of coke continues unrelieved. Blast furnacemen are unable to negotiate further contracts at old rates, and this is the reason given for another advance of 2s. 6d. in the basis prices of Midland forge and foundry pig iron.

CONTRACTS OPEN.

Gasholder and Tank.

The Corporation of the City of Dunedin (N.Z.) invite tenders for the making, delivery, and erection of a frame-guided gasholder complete with tank. [See advert. on p. 266.]

The Stoke-on-Trent City Council have decided to experiment with the erection of a number of "all-gas" houses in the city.

TRADE NOTES.

Order for a Tully Gas Plant.

The Kells Gas Company (Irish Free State) have placed an order with Messrs. Tully, Sons, & Co., Ltd., of Newark-on-Trent, for a complete gasification plant, with the object of supplying all Tully gas in the future.

Contracts Placed by the Birmingham Corporation.

The Birmingham Corporation have placed the following contracts: Messrs. West's Gas Improvement Company, Ltd., for the supply, delivery, and erection of coke handling plant at the Windsor Street Gas-Works; Messrs. James Keith & Blackman Company, Ltd., supply, delivery, and erection of a cold air douche plant at the Saltley Works; Messrs. Humphreys & Glasgow, Ltd., supply and delivery of blue water gas plant at the Adderley Street Gas-Works.

It Pays to "Fescol"-ize.

"Fescol" is the trade name of a process whereby certain metals are deposited on others. The process itself is an electro-chemical one, which does not entail the use of heat. The metals mainly deposited are nickel, chromium, copper, and cadmium, and the application of the process may be divided under three headings—namely, restoration, protection, and decoration, though in many cases the double or triple purpose may be served. For example, a worn part may be brought back to size with a coating which serves as a protection against wear or corrosion, and the surface further treated from the decorative aspect also. Further particulars may be obtained from Messrs. Fescol, Ltd., 101, Grosvenor Road, Westminster, S.W. 1.

British Steel Shelving.

Messrs. Constructors, Ltd., of Imperial House, Charlotte Street, Birmingham, have published an interesting leaflet on adjustable steel shelving for industrial purposes, as produced by them. The light adjustable shelving is ideal for use where light articles are stored or displayed, and has all the adjustment advantages of heavy shelving while maintaining a neat appearance. Are your walls doing their share in displaying or storing goods? Imagine how valuable bare walls become when fitted with adjustable shelves. Not the ordinary wasteful fixed shelves, but really well designed adjustable shelves that can be economically adjusted to stock variations. Let Constructors, Ltd., help by studying your problems and submitting suggestions for storing or displaying your products without obligation.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 29.

There is a decidedly firmer tone about the market so far as pitch is concerned, and sellers' idea of value is not below 45s. per ton f.o.b.

The price of creosote for export continues unchanged at 6¾d. per gall. f.o.b., though lower prices are being accepted for home consumption.

White spirits are unchanged, pure toluole being 2s. 2d. per gall.; pure benzole about 1s. 11d.; and 95/160 solvent naphtha about 1s. 5d. per gall. Pyridine bases are 3s. 9d. to 4s. per gall.

Tar Products in the Provinces.

July 30.

There is no alteration in the markets for tar products.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 25s. Pitch—East Coast, 40s. to 42s. 6d. f.o.b. West Coast—Manchester, 34s. 6d. to 37s.; Liverpool, 36s. 6d. to 39s. 6d.; Clyde, 36s. 6d. to 39s. 6d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3¾d. to 1s. 4½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. to 2s. 0½d. prompt. Naphthalene, £13 to £15. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5	,, 1 6	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

Price Reduction at Crieff.—The annual general meeting of the Crieff Gas Company was held in the Town Hall, Crieff, Dr. T. G. Meikle, Chairman, presiding. The balance-sheet submitted showed the profits of the year to amount to £1425, to which fell to be added balance carried forward from last year of £259—making a total sum to be apportioned of £1684. It was decided to pay a dividend of 7½ p.ct. to the shareholders, which would absorb £887, while £500 was put to reserve, and £297 carried forward. It was decided to reduce the price of gas by 10d. per 1000 c.ft., making the price 4s. 2d. per 1000.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. July 26.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	70—75	..	72½—73
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,551,868	,,	Apl. 11	7½	7½	Alliance & Dublin Ord.	96—99	..	..
374,000	,,	July 11	4	4	Do. 4 p.c. Deb.	62—65	..	..
522,655	,,	Mar. 7	7	7	Barnet Ord. 7 p.c.	115—118	..	..
300,000	1	May 9	1/4½	1/4½	Bombay, Ltd.	19/—21/-	..	..
172,500	10	Mar. 7	8½	9	Bournemouth 5 p.c.	13—13½	..	..
800,080	10	,,	7	7	Do. B 7 p.c.	12½—12½	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	11 1/16—11 3/16
50,000	Stk.	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	..
357,900	,,	Mar. 21	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
371,880	,,	,,	6½	6½	Do. 5 p.c. Con.	100—103	..	..
1,267,500	,,	July 25	5	5	Bristol 5 p.c. max.	87½—88½a*	—2	..
385,000	,,	Apl. 11	8	7½	British Ord.	117—120	..	117—118¾
100,000	,,	June 27	7	7	Do. 7 p.c. Pref.	112—117	..	..
100,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—74	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	96½
100,000	10	May 30	8	8	Cape Town, Ltd.	8½—9½	..	..
180,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	..
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
426,860	,,	July 25	6	6	Cardiff Con. Ord.	95—98*	—2	..
287,840	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
187,150	,,	Feb 21	5	6½	Chester 5 p.c. Ord.	88—93b	..	..
98,936	1	May 9	†2/-	†2/-	Colombo Ltd. Ord.	35/—37/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 11	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/6—22/6	..	..
2,073,280	Stk.	July 25	7	5	Commercial Ord.	95—98*	—2	99
475,000	,,	June 13	8	8	Do 8 p.c. Deb.	56—59	..	56
787,560	,,	Feb. 21	7	7	Croydon sliding scale	110—113	—1	110
468,100	,,	,,	5	5	Do. max. div.	83—86	..	..
542,270	,,	Mar. 7	7	10	Derby Con.	112—117e	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71e	..	..
309,000	,,	Mar. 7	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,002,180	10	Mar. 21	†4	†7	European, Ltd.	16—18	..	16½—17¾
19,708,480	Stk.	July 25	5½	5½	Gas Light & Coke 4 p.c. Ord.	18/6—19/-f*	—/6	18/6—19/4½
2,500,000	,,	,,	8½	8½	Do. 8½ p.c. max.	61—63*	—1½	61½—64
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—76*	—2	76½—77
5,809,620	,,	June 13	8	8	Do. 8 p.c. Con. Deb.	58—61	..	58½—59
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	98½—99½
82,500	,,	Mar. 21	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
268,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	80—85	..	..
70,000	10	Apl. 24	†10	†10	Hongkong & China, Ltd.	14—15	..	..
212,200	Stk.	Mar. 7	5½	6	Hornsey Con. 3½ p.c.	86—89	..	..
1,976,000	,,	May 30	10	20	Imperial Continental Cap.	365—385	—10	363—379
329,180	,,	Feb. 7	8½	8½	Do. 8½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Mar. 7	7½	8	Lea Bridge 5 p.c. Ord.	117—120	..	..
2,145,907	,,	Feb. 21	5½	6½	Liverpool 5 p.c. Ord.	95—96b	..	..
600,000	,,	Mar. 21	7	7	Do. 7 p.c. Red. Pref.	104—106b	..	..
165,786	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap.	124—129	..	..
63,480	,,	June 27	3	3	Do. 3 p.c. Deb.	53—56	..	..
75,000	5	June 13	18	†10	Malta & Mediterranean	5½—6	..	..
392,000	—	Apl. 2	—	5½	Metrop't'n (of Melbourne) 5½ p.c. Red. Deb.	100—102	..	..
641,220	Stk.	May 30	†5	†9	Montevideo, Ltd.	105—108	..	..
2,031,315	,,	Feb. 21	5	5½	Newcastle & Gateshead Con.	17/—17/6d/	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	72½—73½d	..	..
691,705	,,	June 27	8½	8½	Do. 8½ p.c. Deb.	68—69d	..	..
181,780	,,	Mar. 7	7/1/0	7/1/0	North Middlesex 6 p.c. Con.	105—110	..	..
800,000	,,	Apl. 24	9	7	Oriental, Ltd.	115—120	..	..
205,162	,,	June 27	8	8	Plym'th & Ston'house 5 p.c.	110—113	..	..
424,416	,,	Feb. 21	7½	8½	Portsm'th Con. Stk. 4 p.c. Std.	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	82—85	..	..
2,334,464	1	June 27	—	†5	Primitiva Ord.	35/—37/-	—1 -	35/—36/6
244,500	100	June 3	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	78—81*	—1	81
416,345	,,	June 27	4	4	Do. 4 p.c. Cons. Deb.	78—81	..	81
150,000	10	Mar. 21	6	6	San Paulo 6 p.c. Pref.	8½—9	..	..
1,736,968	Stk.	Mar. 21	6½	6½	Sheffield Cons.	108—110e	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	74—77e	..	..
90,000	10	June 13	†4	†4	South African	4—6	..	5
6,609,895	Stk.	July 26	7½	5	South Met. Ord.	102—104*	—2	102½—104½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—107*	—3	..
1,895,445	,,	July 11	3	3	Do. 3 p.c. Deb.	57—60*	..	..
734,000	,,	Mar. 7	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	100½
91,500	,,	Mar. 7	8½	6½	South Shields Con.	106½—107½d	..	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 6 p.c.	103—106*	—4	104—107
468,537	,,	June 27	5	5	Do. 5 p.c. Deb.	95—98	..	..
647,743	,,	Mar. 7	5	5	South'mpton Ord. 5 p.c. max.	77—80	..	79
191,375	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	113—116*	—3	..
360,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,375	,,	Mar. 7	—	6½	Tottenham District Ord.	106—109	..	106—107½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
191,356	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
339,094	,,	Mar. 7	6⅞	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	..
68,890	,,	,,	5	5	Do. 5 p.c. pref.	88—93	..	..
90,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	144—147*	..	..
256,586	,,	,,	7½	7½	Do. B 5½ p.c.	122—127*	..	..
432,585	,,	,,	6 3/10	6 3/10	Do. C and New	100—105*	..	..
352,000	,,	,,	7½	7½	Do. Wimbledon 6 p.c.	112—117*	..	114
98,000	,,	,,	7⅛	7⅛	Do. Epsom 5 p.c.	123—128*	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—92*	..	..
88,416	,,	June 27	8	8	Do. 8 p.c. Deb.	54—57	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
207,500	,,	,,	5	5	Do. 5 p.c. Deb.	93—96	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

Governor-General

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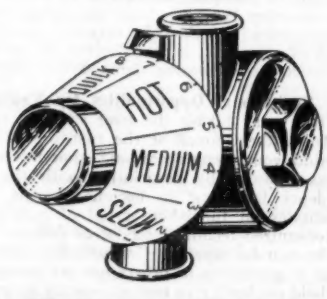

GENERAL GAS APPLIANCES LIMITED

Guide Bridge Manchester

Automatic Street Lighting at Chesterfield.

A new scheme for the automatic lighting of main roads by gas is now having the serious consideration of the Chesterfield Corporation. The Lighting Committee, in a report on the matter, recommend that the lighting of the main roads in the Borough of Chesterfield should be continued to be carried out by means of gas, and that application be made to the Ministry of Health for sanction to borrow £3122 to cover the cost of the improved scheme of automatic lighting. The cost of the main road lighting is put at £1077, and that for all streets and roads other than main roads, £2072, *plus* 5 p.ct. for sundries and contingencies. The Lighting Committee state that the initial cost of the proposed improvements would be more than repaid in ten years by the saving on the cost of lighting. The Committee estimate that at the end of the ten years—the period of the loan—the saving effected would be about £500 per annum. The labour for lighting over that period on the existing basis is put at £15,380; interest and sinking fund is estimated at £4282. The labour for ten years on the automatic basis is put at £9000, and the maintenance of clocks is given as £700.

Proposed Extensions at Sedgley.

The question of the extension or additions to the gas-works was discussed by the Sedgley Urban Council at their last meeting, when the Gas Committee reported that the Manager had submitted sketch plans showing what additional plant was required at the works. The question of acquiring a new site abutting on the railway was further considered, when it was decided that no such land was available for the purpose. Councillor Dews said he questioned the statement that no land was available. There was much land suitable, and sooner or later they would have to face an expenditure of between £20,000 and £30,000 on the gas undertaking. The Chairman assured Councillor Dews that the Gas Committee had taken the matter into very serious consideration. There were two alternatives —either to build a new works or meet a heavy expenditure on supplying the requirements of the district with regard to gas. If suitable land could be obtained it might be better to build a new gas-works rather than go to the extent of £10,000 on the existing works. Tenders for the installation of a water gas plant were submitted. It was resolved that the Ministry of Health be asked to sanction a £2000 loan for the provision of such plant, and that, subject to such consent, the tender of the Vertical Retort Syndicate, Ltd., at £1680 for the supply of a water gas plant capable of producing 150,000 c.ft. per day be accepted. The report of the Committee was approved.

Jedburgh Gas Company.—The annual meeting of this Company was held at the Public Hall, Jedburgh, with ex-Provost Oliver presiding. The yearly financial report was adopted, and a dividend of 5 p.ct. was declared. It was stated that the Company had done an excellent year's business, and had sold one million c.ft. more gas than during the previous year. The Company had reduced the price of gas last February, and were now installing a Tully plant at a cost of £1300.

Metropolitan Gas Company of Melbourne.—Messrs. John Terry & Co. have received a telegram from their Principals, the Metropolitan Gas Company, Melbourne, Australia, informing them that the net profits for the six months to June 30 last were £89,300; a dividend of 6s. 6d. per share has been declared; an amount of £5000 has been transferred to reserve account; and a sum of £61,100 has been carried forward. Dividends will be payable in Melbourne probably on Aug. 1, and those to absentee shareholders will be posted by an early mail.

Staveley Chemical Works Expansion.—The Staveley Coal and Iron Company, Ltd., have made considerable extensions to their plant for the manufacture of electrolytic caustic soda. At the same time they have installed plant for dealing with the chlorine evolved in the process, so as to be able to market synthetic or pure hydrochloric acid and also liquid chlorine. Incidentally, this plant will also enable the firm to increase their output of bleaching powder and of sodium hypochlorite. As the firm have salt works, owned by a subsidiary Company—viz., the British Soda Company—and have at the Staveley Works a large surplus of electricity generated from the waste gases from the coke ovens by means of three large gas engines, each of 7150 H.P., it was decided to make use of the salt and power to meet the increasing demand for caustic soda.

Educational Opportunities for Young Engineers.—At this time of the year, during the long vacation of the technical schools and colleges, the Council of the Institute of Marine Engineers desires to remind young engineers and apprentices of the educational advantages afforded by association with the Institute. Apprentices or students intending to become marine engineers are admitted as graduates on furnishing proof of apprenticeship and studentship at a recognized technical school or college. The Institute's annual examination for Student Graduateship and the accompanying diploma, open to graduates or others not yet associated with the Institute, will be held on April 7-10 next at centres arranged to suit candidates. The superintendent engineers of the leading shipping companies recognize that possession of this diploma is proof of all-round ability in the technical subjects specially required as the foundation of a successful career as a marine engineer. Of particular appeal to ambitious and studious apprentices is the annual offer of the Lloyd's Register Scholarship, value £100 per annum and tenable for three years at an approved university. The next examination for the scholarship will be held on May 12-13 next, at various centres. Full particulars may be obtained from the Secretary, Institute of Marine Engineers, 85, The Minories, London, E.C. 3.

Increased Gas Sales at Accrington.

The annual report of Mr. A. J. Harrison, General Manager of Accrington District Gas Board, records a total expenditure on revenue account of £74,607, and an income of £114,024, leaving a gross profit of £39,417, equal to £10 14s. 8d. p.ct. on net indebtedness. The expenditure decreased by £13,053, and manufacturing costs by £14,159, and there was a decrease of income of £21,342. Gas sales decreased by £9300; coke sales by £5539; tar products by £3572; sulphate of ammonia by £638; and the showroom sales and private fitting work by £468; while miscellaneous receipts increased by £130, and rents by £33. The net profit is £4739. The income from gas was £104,278. The copper handled from automatic meters weighed 148 tons 6 cwt. The average price for gas per 1000 c.ft. sold was 3s. 9·046d., against 4s. 0·978d. for the previous year. The gas produced was 329,746,000 c.ft., the quantity purchased being an increase of 2,164,000 c.ft. over the previous year. Ordinary consumers used 37·27 p.ct.; prepayment consumers 48·73 p.ct.; industrial consumers 11·48 p.ct., and public lighting 2·52 p.ct. The actual gas sold decreased by 962,300 c.ft., due to trade depression. The coke sold was 4398 tons with net receipts of £4818, an average of £1 1s. 11d. per ton. The tar sold was 281,325 galls., the revenue being £3748. The value realized from residual products was £9150 6s., equal to 50·40 p.ct. on cost of coal. The percentage of gas lost was 8·51, against 7·60, and the cost of distribution was £16,015, equal to 6·919d. per 1000 c.ft. of gas sold. Considerable renewals of defective service pipes had been undertaken, the number completely renewed being 1782, and those repaired 133, while 4677 required clearing of naphthalene deposits. The number of cooking and heating appliances fixed totalled 1556. Following the change over to coke oven gas, a considerable number of insufficient supplies were brought to light. The naphthalene difficulty had had a marked effect on gas output, and was mainly responsible for the increase in unaccounted-for gas. Appliances sold through the showrooms were: Cookers, 636; wash-boilers, 421; fires and radiators, 245; grillers, 15; geysers, &c., 27—a total of 1244, equal to a total cash value of £8187. The number of appliances fixed since 1919 totals 13,052. The appliances in use include: Cookers, 3871; wash-boilers, 13,164; grillers, &c., 8693; fires &c., 1703; geysers, 204; engines, 84; furnaces, chip ranges, &c., 120—a total of 37,839. Net capital indebtedness on March 31 was £367,182, or £14,989 less than the previous year.

Cheaper Gas at Thornton-Cleveleys.—As an offset to the increased rate, the Thornton-Cleveleys Council have decided to reduce the price of gas by 3d. per 1000 c.ft. from Sept. 30. The gas undertaking has had a successful year. After loan charges, they had carried £337 to renewals reserve fund, and rates had been relieved to the extent of £2000. The remaining profit of £59 increased the unappropriated profit to £1700.

Street Explosions.—Dr. F. J. Waldo, the City Coroner, has written to the Home Secretary expressing the opinion that the association of coal gas and electric cables of any kind in a subway should be carefully considered by all local authorities. Dr. Waldo's report urged that a Government inquiry should be held into the whole London subway question. He thought attention could be usefully given to gas mains and electric currents of all kinds, as well as to methods of inspection and ventilation, and other safeguards against explosions.

Stirling Gas Leakage Tragedy.—Three persons lost their lives in a gas leakage tragedy in Stirling on July 16. They were sisters, aged 21, 18, and 16 respectively, who were sleeping in the same bedroom at their home in Sutherland Avenue. The discovery was made at 5 o'clock in the morning, when the girls' mother woke in an adjoining room in a semi-stupefied state. She traced the gas to the scullery, where it was escaping from a burst pipe in considerable volume, and the deceased were subsequently found in their room, two already dead and the third dying almost immediately before aid could be rendered. It is thought that the intense heat of the last few days may have been responsible for the burst pipe, and investigations are being made.

Making Wash-Day Easier.—In its latest publication, entitled "To Lighten Wash-Day," the British Commercial Gas Association has made a most interesting and thorough analysis of wash-day work, from the early morning heating up of the water to the final airing of the ironed clothes in the linen airing cupboard. For each operation involved—heating up water, filling and emptying the copper or washing machine, washing, drying indoors, ironing, and airing—they have valuable labour-saving suggestions, fully described, and illustrated by photographs. Every woman—well-to-do, moderately rich, or poor—will find in this book some hints which will help her to make Monday less fatiguing, less worrying. Even those who launder at home only most delicate and expensive silk and lace garments, such as can be done in a modern bathroom, will find practical suggestions.

Messrs. Falk, Stadelmann, & Co.'s Profits.—Messrs. Falk, Stadelmann, & Co., manufacturers of incandescent mantles and burners, lamps, electrical appliances, &c., report a profit for the year ended March 31 of £97,708. The sum includes income from and surplus on realization of investments, and is struck after providing for all administrative charges, depreciation, and amortization of leasehold properties. The business was reconverted into a public Company in June, 1928, when 450,000 preference and 112,500 ordinary shares of £1 each were issued at par and 22s. respectively. Including £3927 brought in, after deducting expenses of the public issue and payment of the ordinary dividend for the year ended March 31, 1928, there is a total of £101,635. Income-tax reserve takes £14,835, and the preference dividend £30,539, leaving £56,261, compared with £69,327. The Directors recommend a dividend at the rate of 7½ p.ct., *less* tax, on the ordinary shares, transferring to reserve £10,000 and carrying forward £13,261.